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AUTOMATING SATELLITE
RANGE SCHEDULING

THESIS

S. Michael Schalck, Captain, USAF

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AUTOMATING SATELLITE RANGE SCHEDULING

THESIS

Presented to the Faculty of the Graduate School of Engineering

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Space Operations

S. Michael Schalck, B.S.

Captain, USAF

DECEMBER, 1993

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Preface

Satellite range scheduling (SRS) is a complex process. I obtained invaluable advice and information in understanding how satellite supports are scheduled. I would like to thank Ken Chambers of the 21 SOPS, Onizuka AFB, CA, John List, Paramax Systems Corporation, and Mitch Finney, 22 SOPS, Falcon AFB, CO, for their technical assistance and support.

Developing an algorithm to automate SRS and writing a thesis document are complex processes. I obtained invaluable advice and information in understanding how to approach both problems. Thank you Captain Tim Gooley for your effort and support in this research. I would also like to especially thank Major John Borsi and Lieutenant Colonel James Moore for their patience, insight, and guidance.

Life at AFTT and in general is a complex process. I obtained invaluable advice and information in understanding how to approach life. Thanks to all my friends and family. Your support and understanding continually uplift me. A special thanks to my mother, my best friend and sanity check. Finally, I would like to thank my Lord for his love, all I do is for his glory.

S. Michael Schalck

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Abstract

The objective of this study was to develop a computer based satellite range scheduling (SRS) algorithm to create a 24 hour satellite support schedule. The algorithm's goal was to schedule as many satellite support requests as possible.

An iterative heuristic approach was used to schedule satellite support requests in three successive sub problems. The first sub problem involves scheduling low altitude satellite support requests using a mixed integer programming approach. The next two sub problems each involve scheduling 12 hour blocks of medium and high altitude satellite support requests, again using a mixed integer programming approach.

Fourteen 24 hour schedules were generated using actual data with encouraging results. At least 95 percent of the satellite support requests were scheduled for each day. These results are in-line with results obtained by range schedulers and previous studies. Because of the promising results, this algorithm may be used to automate a portion of the satellite range scheduling problem.

AUTOMATING SATELLITE RANGE SCHEDULING

I. INTRODUCTION

Overview

Complex, earth-orbiting satellites perform the necessary functions to provide the capabilities required for space support, operation, and control. Although efforts are being made to increase the autonomy of space systems, satellites generally require frequent ground contact to maintain operational health and to transfer satellite mission data. Many satellite systems use the Air Force Satellite Control Network (AFSCN) to communicate with the appropriate ground center.

The AFSCN provides the hardware, software and personnel that allow communication between the satellite and the personnel responsible for the operation and/or mission of the satellite. The AFSCN consists of remote tracking stations (RTSs), communication lines, mission control complexes (MCCs), and resource control complexes (RCCs).

RTSs are located around the world and have one to four antennas and the equipment required to communicate with satellites. Each antenna communicates with one satellite at a time. Because the antenna must track the satellite in order to communicate, satellites must be visible (above the horizon) to the RTS for a support to be scheduled. Communicating with a satellite includes down-linking satellite status telemetry, tracking the satellite, and sending commands to the satellite. Each MCC is responsible for determining the support requirements for the satellites it controls and making satellite

support requests to the RCCs. The RCCs are responsible for allocating RTS time to each MCC in order to meet satellite program requirements. Schedulers in the RCC match satellite support requests from the MCC to a particular RTS.

Satellite range scheduling is the matching of satellite support requests with available and visible RTS antennas. Given the finite number of RTS antennas and the visibility constraints of each satellite, the RCC needs to schedule the maximum number of satellite support requests possible during a 24-hour period. A more detailed explanation of each of the AFSCN component's responsibilities and relationships in the next section defines the scheduling process and the problems encountered.

Background.

Satellite. A satellite is any object which orbits around a larger object and follows the physical laws of orbital mechanics. Presently, millions of objects, mostly debris, orbit the earth, but only tens of thousands are larger than one centimeter in diameter. The United States Space Surveillance Center tracks and catalogs less than ten thousand of the objects which are greater than ten centimeters in diameter. The AFSCN supports around one hundred man-made, operational satellites on a regular basis. These are the satellites referred to for the balance of this thesis.

Satellites are placed at orbital altitudes based on the satellite's intended function and are frequently classified as low, medium, or high altitude. Low altitude satellites have orbital altitudes between 100 and 200 nautical miles in mostly polar orbits. These satellites have the most restrictive RTS visibilities because they are visible over a particular RTS for only 2.5 to 15 minutes. Medium altitude satellites orbit between 1,000 and 12,000 nautical miles above the earth with pass durations over RTSs ranging between 20 minutes and 11 hours. High altitude satellites orbit at altitudes exceeding 12,000 nautical miles with RTS visibilities varying between eleven hours and continuous visibility. As the orbital altitude of a satellite increases, the amount of time the satellite is visible to a RTS

generally increases. RTS visibility and support criticality determine how restrictive a support is in the scheduling process.

Mission Control Complex. A Mission Control Complex (MCC) or Satellite Operations Center (SOPC) is the personnel and equipment that carry out the day to day activities involved with operational control of a particular satellite system. Satellite programs are grouped together in MCCs. Programs with similar support requirements and functions are usually located in the same MCC. Each MCC is responsible for determining the support requirements for its satellites. A MCC will provide the following information to the RCC for each requested support: Greenwich Mean Time (GMT) and tolerance in which the support can be scheduled, length of time required for the support, RTS visibility, RTS set-up time (called RTS turn-around time), and special requests for equipment. The period of time the satellite is visible to a RTS is commonly called a pass. Because of the short visibilities associated with low altitude satellites, the entire time the low altitude satellites are visible to a RTS is scheduled for each support. This is an important differentiation between low altitude satellites and all other satellites. No scheduling tolerance is provided by the MCC to the RCC for scheduling of low altitude satellites while the MCC does provide a scheduling tolerance for other satellites.

Remote Tracking Station. Remote tracking stations (RTSs) are located around the world and consist of one to four antennas and the equipment required to communicate with satellites. Each antenna-equipment package is termed a RTS side. Each antenna can communicate with at most one satellite at a time. The total number of antenna sides is the limiting factor of the AFSCN. Because the antenna must track the satellite in order to communicate, satellites must be visible to the RTS for a support to be scheduled. Communicating with a satellite includes down-linking satellite status telemetry, tracking the satellite, and sending commands to the satellite.

Currently, there are sixteen RTS sides which can perform these three general functions in the AFSCN. There are several additional antennas which are called data-link-terminal (DLT) stations. These stations support satellite program specific data-processing and display (DPAD) supports. A DPAD support is relatively lengthy and is routinely handled by a DLT station; however, a DPAD support can be handled by the sixteen general antennas when necessary.

RTSs periodically schedule downtime for maintenance. Some of these downtimes are important enough to be considered "protected", indicating no flexibility in scheduling the downtime. Satellite supports and RTS down-times cannot be done simultaneously.

Resource Control Complex. The Resource Control Complex contains the equipment and schedulers needed to match satellite support requests from a MCC to a particular RTS side. Conflicts exist when two support requests compete for the same resource or RTS side and cannot be scheduled at some other available RTS side. When conflicts cannot be avoided, schedulers notify the appropriate MCCs to de-conflict the support requests among themselves. This process involves one or more MCCs changing one of the following: the time or tolerance for a support when RTS visibility allows, the length of a support, or, when both the RTS and MCC agree, the RTS setup time before a support.

Satellite Range Scheduling Process. Schedules for each day are started about two weeks before implementation. The requests for supports generated by a MCC for each satellite are listed on a program action plan (PAP) and received by the schedulers at the RCC. The requests allow the schedulers to begin building a feasible schedule and identifying problem requests. As they become available, RTS personnel will provide downtime information and MCCs controlling low altitude satellites will provide support requests. MCCs controlling low altitude satellite programs generally do not submit PAPs because visibilities change too much to predict support times accurately until

approximately 24 hours prior to the required support, so for low altitude satellite programs, MCCs submit support requests anytime during the 24 hours prior to the requested support time.

In general, the schedulers tentatively schedule the relatively flexible PAP requests first, and insert the more restrictive low altitude satellite supports and protected RTS downtimes into the schedule as they become available. The low altitude satellite supports and protected downtimes almost always take priority over the medium and high altitude satellite support requests and unprotected downtimes. The schedule does not become firm until these low altitude satellite requests are received and scheduled by the RCC schedulers.

The schedule generation process can be divided into four separate phases: 1) generation of a "seven day" schedule, 2) generation of an initial 24 hour schedule, 3) conflict resolution, and 4) real-time scheduling.

The first phase in generating a daily schedule is collecting all the support requests for the week-long period starting two weeks later. These requests are received via PAPs from the MCCs supporting high and medium altitude satellites. These relatively long-range requests are randomly scheduled around the RTS-requested downtimes creating a tentative schedule which is distributed back through the AFSCN one week in advance. This schedule is called a seven day schedule and is not firm because the more restrictive low altitude satellite supports are not included. The schedule is used by AFSCN components to ensure all requests have been received and acknowledged by the RCC.

After the seven day schedule has been published, the schedule will be updated iteratively as requests for low altitude satellite supports and RTS downtimes are received to produce an initial 24 hour schedule. Scheduling priority generally reflects the flexibility associated with each request. The more restrictive low altitude satellite support requests usually take precedence over the more flexible medium and high altitude satellite support

requests. However, a medium or high altitude satellite support request can take scheduling priority if the satellite support is critical to the satellite's mission.

RTS downtimes can be classified as 1) routine maintenance, or 2) major maintenance/modification. Routine maintenance is generally quite flexible and the requirements are known in advance. These downtimes are handled much like a high altitude satellite request and are often re-scheduled in order to schedule a more restrictive, higher priority request. Major maintenance or modification includes equipment malfunction and often is short notice with little flexibility. The scheduling of this latter downtime type ranges from low altitude satellite-like scheduling to real-time schedule changes. As these downtimes are realized, they are incorporated into the schedule.

The conflict resolution phase is the 24 hour period prior to real-time and begins with the process of de-conflicting the initial 24 hour schedule. All support and downtime requests have been scheduled and conflicts have been identified in the initial 24 hour schedule. The schedulers call the MCC personnel and/or RTS personnel involved in each conflict; options may be identified and the personnel will be expected to resolve the conflict by changing one of the following: the time or tolerance for a support if RTS visibility allows, the length of a support, or the RTS setup time before a support if the RTS and MCC agree. If the conflict cannot be resolved in this manner, a support request will be canceled. In any conflict situation, all involved personnel will be notified and expected to resolve the conflict.

Real-time scheduling occurs after a conflict-free 24 hour schedule is published and becomes the official schedule for the present day. Changes to this schedule would include satellite vehicle problems, RTS problems, changing mission requirements, incorrect requests by a MCC, or incorrect processing of a request by the schedulers. Changes to the published 24 hour schedule can affect up to one third of the scheduled requests during this phase. Changes to the schedule follow a formal priority system. By following this

system, schedulers can quickly and efficiently determine which support request takes priority when a real-time change occurs and causes a conflict.

Research Objective

The objective of this research is to develop a computer-based, automated scheduling algorithm that generates a feasible, conflict-free schedule. This algorithm should schedule an amount of requests comparable to the current RCC process. Maximizing the number of conflict free supports is analogous to minimizing the number of conflicts in the schedule. Schedulers presently consider all conflicts as equal because, from the scheduler's viewpoint, the same amount of effort is needed for resolving any conflict.

Assumptions

The first assumption is that the satellite range scheduling problem is a static problem. This implies all required data is present in time for the algorithm to be executed before the schedule is needed. Because care has been taken to ensure the algorithm can be accomplished in a reasonable amount of time, this assumption is fairly valid. Limited experience indicates the algorithm needs around two hours to complete a schedule.

The second assumption is that a clear scheduling hierarchy can be established so that requests can be grouped into appropriately sized problems which can be easily solved with current computer resources. Dividing the requests by the restrictivity of each request mirrors the current process.

The third assumption is that all lengthy DPAD supports can be supported by the program specific DLT RTSs. This assumption is made to avoid addressing the process of dividing long supports into smaller, easier to schedule, time periods. This may be an area where further research is warranted and is addressed in the recommendations section of Chapter V.

The fourth assumption is that every visible RTS side is a candidate to fulfill a support request. This assumption simplifies the testing of the algorithm but is not a limitation of the developed algorithm.

The final assumption is that all RTS set-up times or "turn-around" times are standard for low altitude satellites and all other satellites. Twenty minutes was used for low altitude satellites and fifteen minutes was used for all others. These values were used for simplicity and are generally accurate representations. The algorithm can easily handle fluctuations in these times if a look-up table routine is developed to incorporate different times in the support requests.

II. LITERATURE REVIEW

Overview

This chapter outlines information on the satellite range scheduling (SRS) problem. Specifically, an outline of the work done by Captain Tim Gooley in his thesis study titled *Automating the Satellite Range Scheduling Process* is presented followed by a discussion of mixed integer programming (MIP).

Captain Gooley's Formulation

Captain Gooley developed an algorithm for the SRS problem that successfully scheduled around 90 percent of the support requests for a six day period (5:5-2). His algorithm (see Figure 2.1) used a MIP linking procedure for low altitude satellite support requests and an insertion procedure for the medium and high altitude satellite support requests. After each scheduling procedure, a schedule improvement procedure involving interchanging supports was implemented. The MIP formulation Captain Gooley developed was the basis for developing the SRS algorithm in this study.

Mixed Integer Programming

A MIP problem is a linear programming (LP) problem in which some of the variables are required to be non-negative integers (7:446). A generalized branch and bound method for solving MIP problems finds an optimal solution by solving a series of LP relaxations of the MIP problem. The LP relaxation of a MIP problem contains the same problem formulation used in the MIP problem with the elimination of all integer constraints on the variables (7:446). Additional linear constraints are subsequently introduced to bound the variables that were previously required to be integers. Each solution of a LP relaxation of the MIP provides a bound on the best solution possible for the particular MIP problem.

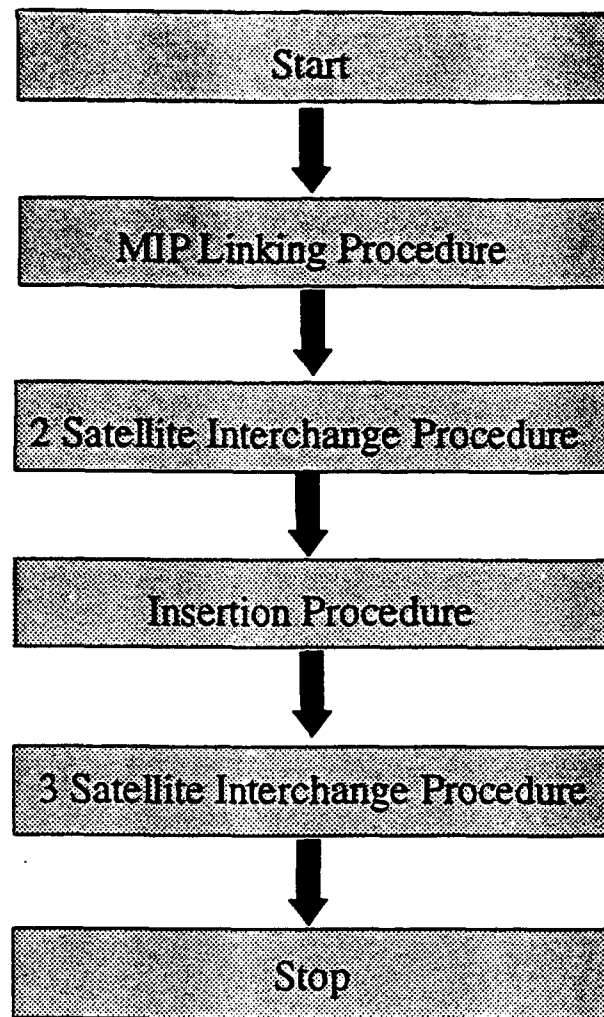


Figure 2.1 Captain Gooley's Algorithm

Solving a MIP problem on a computer can take a long time. Often, terminating criteria are established making computer run times considerably shorter for very complex problems. One method terminates the generalized branch and bound process when a solution within a fixed percentage of the best bound generated in the LP relaxation is reached. This method generally reduces computer run times, but cannot be used to **manage** MIP problem solution computer run times.

III. APPROACH

This chapter includes an overview of the satellite range scheduling (SRS) problem, the formulation of a mixed integer program (MIP) for the SRS problem, an analysis of the MIP formulation, a heuristic approach to the SRS problem, and an outline of the automated SRS algorithm.

Satellite Range Scheduling Problem

The SRS problem involves the scheduling of a large number of time dependent requests for a limited number of resources. A best or optimal schedule is one that schedules the maximum number of requests. Ideally, an automation of the SRS problem will provide an optimal schedule. Therefore, optimization routines are a logical starting point for investigation when developing an algorithm for the SRS problem. When solving scheduling problems where a decision variable can be represented as a binary variable, a mixed integer program approach is often used. In the SRS problem, the scheduling of a support request at a particular RTS side is represented as a binary decision variable and the start time of a scheduled support is a continuous variable.

Mixed Integer Programming Formulation

The objective of the scheduling problem is to maximize the number of supports scheduled. This is the same as minimizing the number of conflicts the scheduler has to resolve. Constraints include: 1) the number of RTS sides, 2) each support must be scheduled only once and within its visibility window, 3) for medium and high altitude satellites, each support must be scheduled within its tolerance window, and 4) no overlapping supports may be scheduled at the same RTS side. Overlapping supports are defined as two support requests scheduled at the same RTS side with any portion of the support times intersecting. Support time includes the RTS turn-around-time or pre-pass time associated

with a support as well as the actual support duration. The balance of this section will detail a MIP formulation of this problem.

Input Parameters. Input parameters are the known constants which are used to define and constrain the decision variables. In the following definitions, the index i refers to a particular support request, the index h refers to a particular support request that is not i , the index j refers to a particular RTS side, and the value n refers to the number of support requests in a MIP formulation. Using these indices, the input parameters for the SRS MIP formulation are defined as:

BV_{ij} - Beginning of low altitude satellite visibility window or medium or high altitude satellite tolerance window for support i at RTS j .

EV_{ij} - Ending of low altitude satellite visibility window or medium or high altitude satellite tolerance window for support i at RTS j .

R_{ij} - Length of requested support i at RTS j .

TO_i - RTS set-up or turn-around time for support i .

RTS_i - set of RTS sides where support i is feasible.

M - large positive constant value.

The following sets are defined so that for every pair of supports i and h that can overlap at an RTS side j , the ihj combination will be a member of exactly one set.

D12 - set of overlapping support request combinations at a particular RTS side j where both requests can be feasibly scheduled only with support i before support h at j (see Figure 3-1).

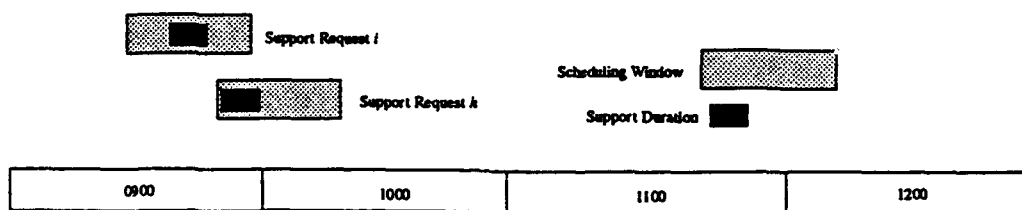


Figure 3.1 Support Request Combinations in D12

D21 - set of overlapping support requests combinations at a particular RTS side j where both requests can be feasibly scheduled only with support h before support i at j (see Figure 3-2).

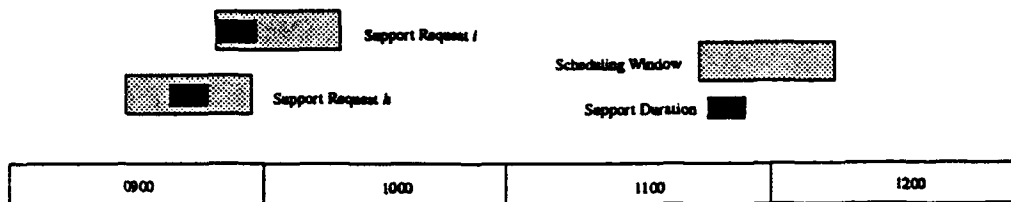


Figure 3.2 Support Request Combinations in D21

DE - set of overlapping support requests combinations at a particular RTS side j where both requests can be feasibly scheduled in either order at j (see Figure 3-3).

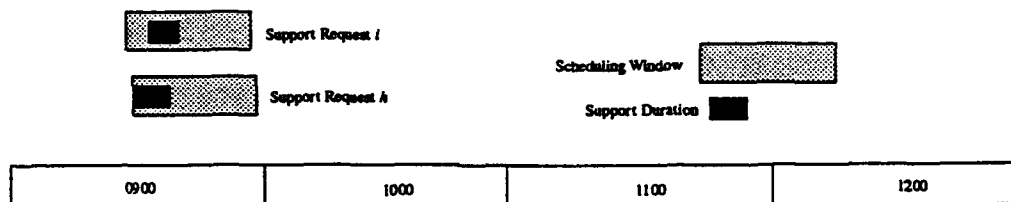


Figure 3.3 Support Request Combinations in DE

DN - set of overlapping support requests combinations at a particular RTS side j where both requests cannot be feasibly scheduled at j (see Figure 3-4).

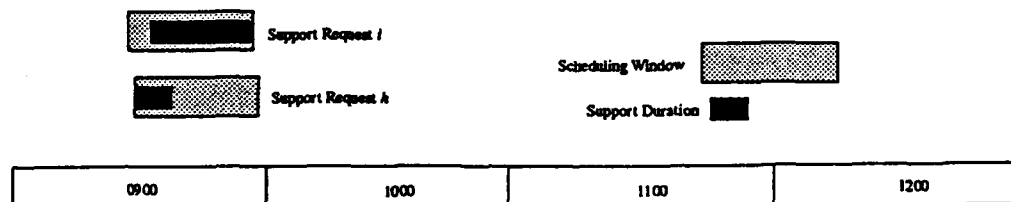


Figure 3.4 Support Request Combinations in DN

Decision Variables. There are three sets of decision variables. Two of the sets of decision variables are used to generate the schedule and the third set is used to ensure feasibility of the schedule.

The first set of decision variables, X_{ij} , are the binary variables which are set to one if support i is scheduled at RTS side j , otherwise they are set to zero.

$$X_{ij} = \begin{cases} 1 & \text{if support } i \text{ at RTS side } j \quad \forall i, j \in RTS_i \\ 0 & \text{otherwise} \end{cases}$$

For each i there can be at most one X_{ij} equal to one.

The second set of decision variables used in determining the schedule, ST_{ij} , indicates the start time for support i at RTS side j . This decision variable is constrained by the visibility or tolerance window along with the availability of RTS side j . ST_{ij} is a continuous, non-negative variable.

The third set of decision variables, y_{ihj} , is used to determine the order of supports i and j which are scheduled at RTS side j . It is used when supports i and j can both be feasibly scheduled with either one occurring before the other. In this case, constraints can be developed to ensure the scheduled supports do not overlap. This decision variable, y_{ihj} , is a binary variable which is set to one if support h starts before support i at RTS side j . If support i starts before support h at RTS side j , then y_{ihj} is set to zero.

$$y_{ihj} = \begin{cases} 1 & \text{if } ST_{hj} < ST_{ij} \quad i \neq h \\ 0 & \text{if } ST_{hj} \geq ST_{ij} \end{cases}$$

SRS MIP Formulation. Using the indices, input parameters, and decision variables explained above, the SRS MIP problem can be formulated as:

Objective Function:

$$\text{Maximize } \sum_{i=1}^n \sum_{j \in RTS_i} X_{ij} \quad (3-1)$$

Subject to:

$$\sum_{j \in RTS_i} X_{ij} \leq 1 \quad i=1 \dots n \quad (3-2)$$

$$ST_{ij} \geq BV_{ij} * X_{ij} \quad i=1 \dots n, \quad \forall j \in RTS_i \quad (3-3)$$

$$ST_{ij} \leq (EV_{ij} - R_{ij}) * X_{ij} \quad i=1 \dots n, \quad \forall j \in RTS_i \quad (3-4)$$

$$ST_{hj} - ST_{ij} + .5 \leq M(1 - y_{ihj}) \quad \forall (i, h, j) \in DE \quad (3-5)$$

$$ST_{ij} - ST_{hj} \leq M * y_{ihj} \quad \forall (i, h, j) \in DE \quad (3-6)$$

$$ST_{ij} + R_{ij} + TO_h \leq ST_{hj} + M * y_{ihj} + M(1 - X_{ij}) + M(1 - X_{hj}) \quad \forall (i, h, j) \in DE \quad (3-7)$$

$$ST_{hj} + R_{hj} + TO_i \leq ST_{ij} + M(1 - y_{ihj}) + M(1 - X_{ij}) + M(1 - X_{hj}) \quad \forall (i, h, j) \in DE \quad (3-8)$$

$$ST_{ij} + R_{ij} + TO_h \leq ST_{hj} + M(1 - X_{ij}) + M(1 - X_{hj}) \quad \forall (i, h, j) \in D12 \quad (3-9)$$

$$ST_{hj} + R_{hj} + TO_i \leq ST_{ij} + M(1 - X_{ij}) + M(1 - X_{hj}) \quad \forall (i, h, j) \in D21 \quad (3-10)$$

$$X_{ij} + X_{hj} \leq 1 \quad \forall (i, h, j) \in DN \quad (3-11)$$

$$X_{ij} \in \{0,1\}$$

$$y_{ihj} \in \{0,1\}$$

$$ST_{ij} \geq 0 \quad \forall i, j \in RTS_i$$

MIP Analysis

The objective function maximizes the number of supports scheduled:

$$\text{Maximize } \sum_{i=1}^n \sum_{j \in RTS_i} X_{ij} \quad (3-1)$$

Equation (3-1) has a X_{ij} variable for every possible RTS side-request combination.

Subject to:

Schedule each support request at most once. Constraint (3-2) insures a support request is not scheduled at more than one RTS side. One constraint is generated for each support request i and a X_{ij} decision variable is created for every feasible RTS side j .

$$\sum_{j \in RTS_i} X_{ij} \leq 1 \quad i = 1 \dots n \quad (3-2)$$

Schedule each support request in its visibility or tolerance window. Each support request has a time window in which the support can be scheduled. For a low altitude satellite, the window is determined by the RTS visibility. For medium and high altitude satellites, a MCC requested time and tolerance along with RTS side availability will determine the window in which a support can be scheduled. A scheduled support must start after the beginning of the window and conclude before the end of the window. Two constraints are active for each scheduled request.

$$ST_{ij} \geq BV_{ij} * X_{ij} \quad i = 1 \dots n, \quad \forall j \in RTS_i \quad (3-3)$$

$$ST_{ij} \leq (EV_{ij} - R_{ij}) * X_{ij} \quad i = 1 \dots n, \quad \forall j \in RTS_i \quad (3-4)$$

Schedule no overlapping supports. RTS sides can support only one satellite at a time. Therefore, if two support requests are scheduled at the same RTS side, the following constraints ensure no portion of their service times overlap. Service time includes the RTS set-up time or turn-around time and the actual support time. When overlapping support requests are constrained to a particular scheduling order or to only support i or support h scheduled at RTS side j , by their support scheduling windows, y_{ihj} variables will not be generated. When more y_{ihj} variables are introduced into the MIP formulation than necessary, these binary variables exponentially increase the problem complexity and computer run time. By using all the information in the support requests, the number of y_{ihj} variables can be kept to a minimum. Equations (3-5) and (3-6) are

used to define the y_{ihj} variables when appropriate. Equation (3-5) sets y_{ihj} to zero when ST_{hj} is greater than (after) ST_{ij} . Equation (3-6) sets y_{ihj} to one when ST_{hj} is less than (before) ST_{ij} .

$$ST_{hj} - ST_{ij} + .5 \leq M(1 - y_{ihj}) \quad \forall (i, h, j) \in DE \quad (3-5)$$

$$ST_{ij} - ST_{hj} \leq M * y_{ihj} \quad \forall (i, h, j) \in DE \quad (3-6)$$

Equations (3-7) and (3-8) are required under the same conditions as Equations (3-5) and (3-6) and ensure scheduled supports do not overlap. One of the two constraints is active, depending on the value of y_{ihj} , when both supports are scheduled at RTS_j .

$$ST_{ij} + R_{ij} + TO_h \leq ST_{hj} + M * y_{ihj} + M(1 - X_{ij}) + M(1 - X_{hj}) \quad \forall (i, h, j) \in DE \quad (3-7)$$

$$ST_{hj} + R_{hj} + TO_i \leq ST_{ij} + M(1 - y_{ihj}) + M(1 - X_{ij}) + M(1 - X_{hj}) \quad \forall (i, h, j) \in DE \quad (3-8)$$

Equations (3-5), (3-6), (3-7), and (3-8) are generated for every overlapping support request-RTS side visibility combination where the order of the scheduled supports is not constrained by the scheduling windows

If two support requests at a particular RTS side overlap and the two supports can be scheduled in only one order, that is, one support must be scheduled before the other in order for both supports to be scheduled at the same RTS side j , one of the following constraints is active:

$$ST_{ij} + R_{ij} + TO_h \leq ST_{hj} + M(1 - X_{ij}) + M(1 - X_{hj}) \quad \forall (i, h, j) \in D12 \quad (3-9)$$

$$ST_{hj} + R_{hj} + TO_i \leq ST_{ij} + M(1 - X_{ij}) + M(1 - X_{hj}) \quad \forall (i, h, j) \in D21 \quad (3-10)$$

These equations ensure no overlap of scheduled supports occur given the set order in which the supports must occur if they are both scheduled at the same RTS side.

The only remaining case is when both supports cannot be feasibly scheduled at the same RTS side. When this condition is met, the following constraint is generated:

$$X_{ij} + X_{hj} \leq 1 \quad \forall (i, h, j) \in DN \quad (3-11)$$

This constraint allows at most one of the two support requests to be scheduled at a particular RTS side.

The y_{ihj} variable is not used if $ihj \in \text{DN}$. Overlapping low altitude satellite requests are members of the set DN and cannot be feasibly scheduled at a particular RTS side j , so the y_{ihj} variable is not required in the scheduling of low altitude satellites.

The SRS problem is too large for a MIP formulation containing all the support requests for a single day to be practical. When solving MIP formulations which included all the support requests for a 24 hour period, it routinely took days to reach an acceptable solution. For the purposes of this study, one hour of computer processing time was considered reasonable for generating a 24 hour schedule. Therefore, a heuristic method is used to solve the SRS problem.

SRS Heuristic

Because computer run times make a MIP formulation with all the support requests for an entire day impractical, a heuristic approach was developed to limit computer run time and find an acceptable schedule. Figure 3.5 outlines the heuristic approach used. The first step in the process is to separate the requests into smaller problems with fewer requests. The smaller problems are solved iteratively one at a time, ensuring subsequent iterations do not change the schedule developed by earlier iterations. The smaller problems are solved with a MIP formulation approach. Finally, the blocks of scheduled requests are combined into a 24 hour schedule. Implementing this approach requires a logical criteria for dividing the similar support requests into blocks.

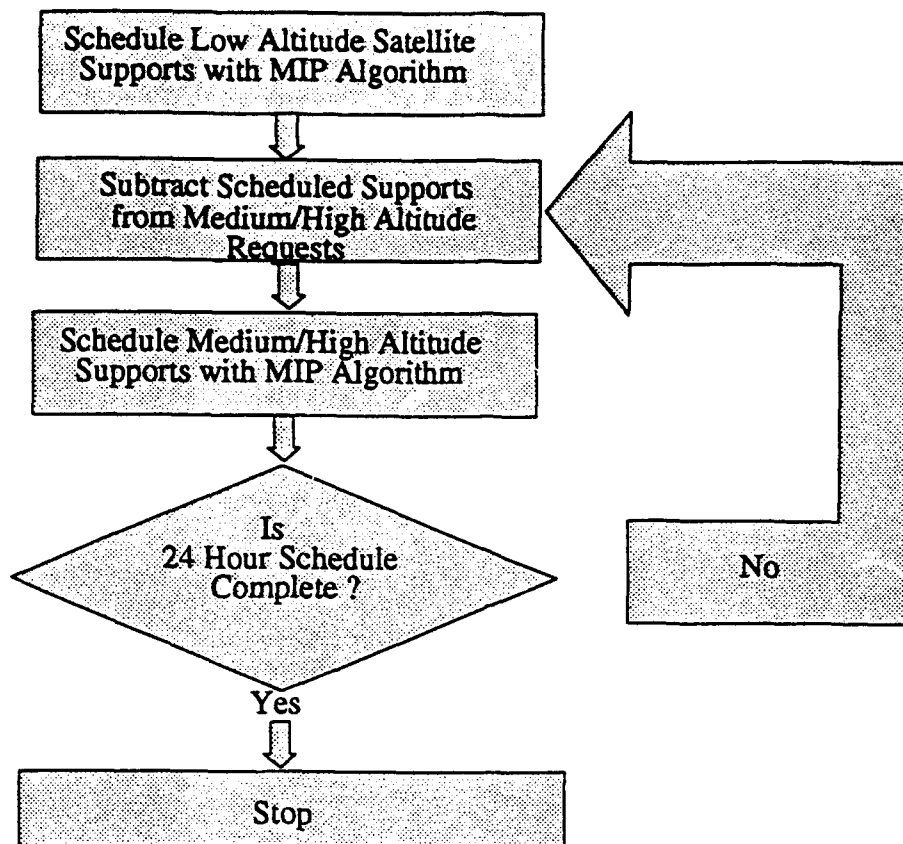


Figure 3.5 SRS Scheduling Algorithm

Altitude Division. Because low altitude satellite support requests take precedence over medium and high altitude satellite support requests, a natural division of the requests exists. By dividing the SRS problem between the low altitude satellite support requests and all other satellite support requests and scheduling the low altitude satellite supports first, the opportunity to optimally schedule as many low altitude satellite support requests as possible is maintained. Subsequent scheduling of the medium and high altitude satellites using an optimization routine cannot guarantee scheduling as many of these as possible.

Time Division. No known precedence criteria exists for dividing the remaining medium and high altitude satellite support requests. This remaining block of support requests, when introduced into the MIP formulation, generate enough discrete variables to make solution time unreasonable. To overcome this problem, the requests are sorted by start time and divided into blocks of less than 24 hours. Testing shows splitting the medium and high altitude requests into 12 hour blocks resulted in reasonable computation times.

MIP Termination. A branch and bound process is used to solve each MIP problem. Complex problems take a long time to solve when every branch in the problem is required to be explored. Termination conditions are used to shorten MIP solution times by allowing the solution process to stop when a condition is satisfied. A terminating condition can be the number of iterations the solver completes, the amount of resources implemented in a problem, or a solution within some percentage of the upper bound for the MIP problem determined by solving the linear programming (LP) relaxation of the MIP problem.

For this study, a tolerance of five percent from the upper bound was used in terminating the MIP solution process. This value was used to limit the solution time of the MIP problem. Any solution within five percent of the best possible solution for the MIP terminates the MIP solver. When the tolerance was reduced, the possibility of excessively long solution times increased. Results obtained when this tolerance is varied are discussed in Chapter IV. The merits of this and other means of terminating the solution process are discussed in Chapter V.

SRS Algorithm

The basic flow of the scheduling process developed in this study mirrors the process followed by the schedulers at the RCCs. The most restrictive requests with the highest priorities are scheduled first, followed by blocks of similar requests with progressively

higher flexibility and lower priority. Hard schedule requirements with high priority and no flexibility can be inserted into the schedule at the start of the process.

Scheduled supports or activities have an associated time, duration, and RTS side. All previously scheduled time blocks are subtracted from a particular RTS side's available times for the next block of requests. This process is used to maintain schedule integrity when scheduling iteratively over the same time period. Previously scheduled activities must be avoided in later MIP scheduling formulations. This process of subtracting higher priority, previously scheduled activity times from a particular RTS side's available times for the next block of requests and then subsequently scheduling that block of requests using a MIP formulation can be repeated as often as required to generate a schedule.

IV. RESULTS

Overview

This chapter includes: 1) a summary of the SRS algorithm scheduling performance results, 2) a summary of the SRS algorithm computational results, 3) the impact of changing RTS turn-around times and MIP problem computational time limiting constants on the performance of the SRS algorithm, 4) a comparison of our results with those of Captain Gooley's algorithm and the RCC schedulers, 5) details on unscheduled support requests, and 6) a discussion of algorithm limitations. Scheduling performance is a measure of the number of supports requested and the number of supports scheduled. Computational performance is determined by the solution timeliness of the algorithm.

Scheduling Performance

This section details the results of test runs using actual AFSCN data for two one-week periods. The first week of data covers the week of 12 October 1992 to 18 October 1992 and is the same data Captain Gooley used in his research. The second week of data covers 12 July 1993 to 18 July 1993. Both sets of data were provided by Ken Chambers, technical advisor, 21 SOPS, Onizuka AFB, CA. [The data is in an ASCII file from the ASTRO general list database and is called a DEFT file.]

The first set of data contained the support requests, the satellite visibilities, and the RTS down-times in one large file. The second week of data was sent in four individual files: 1) low altitude satellite support requests, 2) all other satellite requests, 3) RTS down-times, and 4) satellite RTS visibilities. The format of the second week of data was slightly different from that of the first week of data. This required several minor modifications to the Pascal programs used for data processing.

Scheduling Results. The statistics for the daily scheduled satellite support requests were calculated by summing the low altitude satellite support schedule results and the two 12 hour blocks of medium and high altitude satellite support schedule results for each corresponding day. Table 4.1 contains the statistics for the daily schedules produced.

Table 4.1 Summary of Results, Daily Satellite Support Requests.

Day	# Requested	# Scheduled	% Scheduled
1	322	312	96.9
2	302	296	98.0
3	311	303	97.4
4	318	311	97.8
5	305	296	97.0
6	299	292	97.7
7	297	291	98.0
8	293	288	98.3
9	308	306	99.4
10	328	319	97.3
11	322	318	98.8
12	312	303	97.1
13	296	295	99.7
14	264	257	97.3

As discussed earlier, these results do not include RTS downtimes or DPAD requests. Low altitude satellite support scheduling performance and medium and high altitude satellite support scheduling performance are presented separately. Scheduling

performance may be less than optimal in some cases in order to increase solution timeliness. This is discussed in the next section. A complete listing of all the requests for Day 1, a detailed explanation of the complete algorithm, and the final schedule for Day 1 are provided in Appendix A.

Break-down of Results. The test results for the low altitude satellite support requests include a RTS turn-around or set-up time of 20 minutes. The test results for the medium and high altitude satellite support requests include a RTS turn-around or set-up time of 15 minutes. Table 4.2 contains the scheduling results for the low altitude satellite supports and the medium and high altitude satellite supports for the 14 days of data.

Day 1 to Day 7 results should not be compared with Day 8 to Day 14 results because there is a nine month time difference between the two data sets. The number of satellites in the AFSCN have likely changed during this time and would change the number of requests per week. Day 14 has substantially fewer low altitude satellite support requests than the other days. The variance in support request data illustrates the need for some standard test data that can be used in the future for testing an AFSCN scheduling model. This point is discussed in Chapter V.

Table 4.2 Scheduling Performance by Altitude.

Low Altitude Performance				Medium and High Altitude Performance		
Day	# Requested	# Scheduled	% Scheduled	# Requested	# Scheduled	% Scheduled
1	153	149	97.4	169	163	96.4
2	137	134	97.8	165	162	98.8
3	146	143	98.0	165	160	97.0
4	142	140	98.6	176	171	97.2
5	142	136	95.8	163	160	98.2
6	144	138	95.8	155	154	99.4
7	142	138	97.2	155	153	98.7
8	118	115	97.5	175	173	98.9
9	127	126	99.2	181	180	99.4
10	132	130	98.5	196	189	96.4
11	122	120	98.4	200	198	99.0
12	134	132	98.5	178	171	96.1
13	120	120	100	176	175	99.4
14	91	87	95.6	173	170	98.3

Computational Performance

The computational performance of the heuristic is presented separately for low altitude satellite supports and the medium and high altitude satellite supports. Computational performance is a measure of how well the scheduling algorithm performs with respect to algorithm run-time. Several days of computer time can be required to solve a MIP problem. The SRS problem requires a more timely response.

Two approaches for limiting computer run times were implemented in the algorithm. The first approach involves limiting the number of discrete variables in each MIP problem. Limiting the number of variables per MIP problem was accomplished by dividing the requests for a 24 hour period into smaller groups based on altitude and time blocks. The second way to limit computer run times is to introduce a MIP solver termination criteria. For most computer runs in this study, the MIP solver terminates when a solution better than 95 percent of a calculated value was found. This calculated value is an upper bound calculated by solving the linear programming (LP) relaxation of the MIP problem. The percentage of the upper bound value that terminates the MIP solver can be 1) raised, to possibly increase scheduling performance at the risk of increasing computer run times, or 2) lowered, to possibly decrease computer run times at the risk of decreasing scheduling performance.

For this study, one hour of computer time was considered acceptable for generating a 24 hour schedule. Therefore, 20 minutes was set as a flexible limit for each MIP solution time. The MIP computer run-times for the 24 hour low altitude request blocks averaged less than 10 minutes and for the 12 hour medium and high altitude blocks remained generally below 20 minutes. Because computer run time can be linked to the number of discrete variables in each MIP problem, the number of discrete variables in each MIP formulation were recorded.

The summary of computational results for low altitude satellites in Table 4.3 include the number of discrete variables for each MIP formulation, the amount of central processing unit (CPU) time required for each MIP formulation, and the percentage of requests scheduled. CPU time is a better metric for measuring computational performance than real elapsed time because it is not effected by the computer loading at the time of the MIP solution. A VAX 6420 computer was used.

Table 4.3 Computational Results, Low Altitude Satellites.

Day	# Variables	% Scheduled	CPU Time
1	339	97.4	7:23
2	290	97.8	5:36
3	311	98.0	6:39
4	319	98.6	7:06
5	318	95.8	2:13
6	326	95.8	9:48
7	303	97.2	6:19
8	260	97.5	1:32
9	287	99.2	2:13
10	296	98.5	11:54
11	277	98.4	10:18
12	300	98.5	11:54
13	270	100	1:53
14	209	95.6	5:01

Table 4.4 presents the results of three MIP runs for each day for the medium and high altitude satellite support requests. The first two entries for each day are for the 12 hour blocks of requests and the third entry is for the 24 hour block. The third entry generally shows the non-linear relationship between the number of discrete variables and the CPU time.

Table 4.4 Computational Results, Medium and High Altitude Satellites.

Day	Run #	# Variables	% Scheduled	CPU Time hr:mn:sec
1	1	568	95.3	9:00
1	2	654	97.6	10:37
1	3	1233	94.7	47:37
2	1	756	97.6	18:23
2	2	652	98.8	11:18
2	3	1415	98.8	1:23:13
3	1	708	94.3	18:46
3	2	635	100.0	13:06
3	3	1345	97.6	1:11:28
4	1	92	97.8	25:07
4	2	660	96.4	15:31
4	3	1581	96.6	1:48:03
5	1	852	97.8	21:42
5	2	583	98.6	10:27
5	3	1443	99.4	1:10:42
6	1	689	98.7	14:25
6	2	683	100	13:53
6	3	1380	99.4	4:47:52
7	1	699	97.5	14:40
7	2	741	100	14:19
7	3	1441	98.7	1:21:02
8	1	719	98.9	17:42

8	2	733	98.8	16:26
8	3	1493	97.7	1:21:02
9	1	881	100	26:16
9	2	678	98.8	18:47
9	3	1592	99.4	2:02:25
10	1	920	96.2	35:26
10	2	804	96.7	25:58
10	3	1749	98.0	2:55:40
11	1	1042	98.3	48:50
11	2	654	100	15:32
11	3	1719	99.5	2:43:02
12	1	746	96.9	19:38
12	2	677	95.1	16:22
12	3	1456	97.8	6:47:16
13	1	980	100	31:57
13	2	657	98.6	13:55
13	3	1493	97.7	55:16:5
14	1	847	97.9	23:42
14	2	801	98.7	18:31
14	3	1676	100	8:41:57

Again, the results from week one should not be directly compared with week two. The value for "% Scheduled" is based on the number of requests submitted to the RCC and should not be confused with the upper bound value calculated by the LP relaxation of the MIP formulation and used to terminate the MIP when a solution within 95 percent of

the bound is found. The number of requests included in the MIP formulation for each time period for medium and high altitude satellites can be lower than the number of requests submitted to the RCC. Recall, medium and high altitude satellite support requests are divided into 12 hour blocks in order to develop schedules in a timely manner. Because overlapping requests occur at this break and the division between the low and the medium and high altitude requests, a discontinuity exists for the blocks of requests. Any support request that gets scheduled at a RTS side when solving a MIP formulation becomes part of a fixed schedule and a RTS side becomes unavailable for the scheduled time period. When a scheduled support or activity overlaps a request from the next block of requests to be scheduled, the scheduled supports must be subtracted from the available RTS side-support request combinations for the next block of requests to ensure scheduled supports do not overlap at a RTS side. This subtracting process can decrease the number of requests included in a MIP formulation or shorten the scheduling window for a request.

Changing MIP Parameters

This section presents the effects of changing 1) the turn-around times or RTS set-up times and 2) the percentage of a bound on the optimal solution that terminates the MIP solver. These constants were altered in order to explore how they affect the MIP performance.

As explained earlier, the turn-around times for the low and the medium and high altitude satellite supports were standardized for simplicity in this study. Times of 20 minutes for the low altitude satellite supports and 15 minutes for the medium and high altitude satellite supports were used. These numbers were used for representation purposes and could be changed to more accurate values if needed.

If the resources of the AFSCN remain constant and the demands on these resources increase to a point where an acceptable schedule cannot be developed, it may be necessary in the future to increase or better utilize RTS resources. One way of better

utilizing RTS sides is to lower turn-around times. Currently, the turn-around times for supports are routinely lowered by schedulers in order to schedule a support request. In order to determine how the MIP algorithm would respond, these values were reduced and test runs were re-accomplished for a portion of data. To insure satisfactory scheduling performance, the termination criteria was also raised from 95 percent to 97 percent for the low altitude satellite support requests. The effects on scheduling performance and computational performance of the algorithm are presented in Table 4.5. The table contains results for test runs for low altitude satellite requests for days one through five with a turn-around time of zero.

Table 4.5 Low Altitude Support Requests

(0 minute turn-around times, 97% MIP termination value).

Day	Variables	# Requested	# Scheduled	CPU
Day 1	339	153	153	1:26
Day 2	291	137	137	4:44
Day 3	311	146	146	5:49
Day 4	319	142	142	1:18
Day 5	318	142	142	1:17

When the turn-around times for the low altitude satellites were lowered to zero, the CPU times dropped and the percentage of requests scheduled increased as shown in Table 4.5. The number of variables remained constant because the overlap variable, y_{ihj} , is not used for the low altitude satellite requests. Because the low altitude support is scheduled for the entire request window, the order in which supports are scheduled is

determined by the start of the visibility windows. If one support request window starts before another request window, then the request with the earlier beginning of visibility (BV) time must be scheduled earlier than the latter request. When requests overlap, they cannot both be scheduled at a particular RTS side.

The turn-around times for the medium and high altitude satellites were arbitrarily lowered to eight and zero minutes. The CPU times increased and the percentage of requests-scheduled increased. The number of variables increased because, by shortening the total support time within a constant scheduling tolerance window, the order in which overlapping support requests can be scheduled becomes less restrictive. In other words, more supports can feasibly be scheduled in any order. This increases the number of y_{ihj} variables. A MIP termination criteria value of 95 percent was used for these runs to avoid excessive solution times caused by the increase in variables. Table 4.6 contains the results of runs for Days eight and nine with turn-around times (TAT) of zero and eight minutes.

Table 4.6 Medium and High Altitude Requests (0 and 8 minute turn-around times).

Day	Run #	TAT	# Variables	# Requested	# Scheduled	CPU Time
8	1	0	858	91	91	1:51:18
8	1	8	799	91	91	4:35:07
8	2	0	916	84	84	19:04
8	2	8	916	84	83	19:10
9	1	0	1122	96	96	3:26:29
9	1	8	1015	96	96	28:30
9	2	0	871	85	84	21:10
9	2	8	782	85	83	19:29

When the turn-around times were lowered for the low altitude satellite support requests, a lower than expected result was obtained for Day 2. The percentage of requests-scheduled results for Day 2, with a turn-around time of zero, were unexpectedly lower than the run with a turn-around time of 20 minutes. Therefore, the termination value was raised to 97 percent of the upper bound value to force the MIP algorithm to find a better solution before stopping. Table 4.7 shows the results when the MIP termination tolerance value is changed with everything else held constant.

Table 4.7 MIP Termination Value Comparison (0 minute turn-around).

Day	MIP termination value	Variables	# Requested	# Scheduled	CPU Time
2	95%	291	137	131	1:49
2	97%	291	137	137	4:44

Comparison of Results

There is a difference in the processing of requests between Captain Gooley's study and this study. The number of requests and the scheduling tolerance windows for the medium and high altitude satellite support requests are different. Based on personal experience and with the help of the schedulers at the RCC, the requests in this study were processed to obtain a more accurate representation of the actual requests from the MCCs. The tolerance windows for the requests Captain Gooley used are larger than the actual

tolerances submitted from the MCC and are closer to the visibility windows for the satellites.

Captain Gooley's support requests for medium and high altitude satellites could not be scheduled using the MIP algorithm in this study. The lengthening of the support tolerance window increases the number of combinations for the MIP solver to check. This increases the number of y_{ihj} variables which greatly increases the time required to solve the MIP problem.

The results of this study are encouraging and are in-line with results obtained by Captain Gooley, IBM, and RCC schedulers. Captain Gooley's algorithm scheduled 90 to 95 percent of the supports requested. IBM tested their algorithm with completely different data and scheduled around 98 percent of the supports requested. RCC schedulers routinely schedule 95 to 98 percent of the requested supports. The absence of a common, well defined set of test data makes any comparison of scheduling algorithms difficult. Captain Gooley and this research used the same data, but the difference in the data processing produces different support requests. This makes a direct comparison of results between Captain Gooley's study and this study impossible. The omission of RTS down-times does not invalidate this study. Neither Captain Gooley's study nor this study included RTS down-times in the scheduling process. RTS down-times are addressed in the next section and in Chapter V.

One major difference between Captain Gooley's algorithm and this study's algorithm is the effect the flexibility of the support requests has on the performance of the algorithm. Captain Gooley's insertion and interchange procedure is not adversely effected by requests with long scheduling tolerance windows where request overlaps occur frequently. The MIP algorithm's solution time can become excessive if many requests overlap and generally terminates quickly when the requests are less flexible. This is illustrated by the superior computational results obtained by the MIP algorithm for the low

altitude support requests in comparison to the medium and high altitude support requests. The case for some mix of these two algorithms is presented in Chapter V.

Unscheduled Support Requests

Unscheduled support requests usually occur because of a conflict with a previously scheduled, higher priority support request or with another support request which is scheduled. Occasionally, an unscheduled support could be scheduled if the MIP algorithm's termination criteria is increased. This results in increased solution time. Trade-offs between CPU time and the best schedule obtained were made for this study when the percentage of the upper bound value that terminated the MIP solver was set at 95 percent. Operationally, some other termination criteria, possibly based directly on CPU time, may make sense.

Algorithm Limitations

This study only addresses satellite support requests. RTS down-times and long DPAD supports were not included in the schedules. RTS down-time tolerances could not be readily discerned from the available data. If this data can be provided or processed into a format like that of the support requests and if a scheduling priority is defined, these requests could easily be included in the scheduling process.

The assumption that all DPAD supports are scheduled entirely at DLT stations is not entirely realistic (3), but those supports that are scheduled on the sixteen common RTS sides are usually divided into shorter supports and inserted in the schedule where possible. These requests have special rules for when they can be divided and a priority associated with each requested time period. Generation of a program to process and determine these parameters is beyond the scope of this study.

Long support requests, over 100 minutes in duration, are routinely deleted in the pre-processing subtraction of previously scheduled, fixed supports from the requests to be submitted to the MIP problem. Requests covering long time periods will likely overlap a

support scheduled by a previous MIP run. When this occurs in this algorithm, the request is deleted because the previously scheduled support takes precedence and is fixed.

Operationally, these supports are often divided into smaller supports and scheduled at several RTS sides. This resembles the scheduling of DPAD supports and was not addressed in this study.

Medium and high altitude satellite support requests that could possibly be scheduled before or after a previously scheduled support at a particular RTS side are constrained by the algorithm to either before or after the scheduled support. The pre-processing program limits the support request window to the side with the larger time period. Captain Gooley's insertion and interchange algorithm could be used when these requests are not scheduled, to possibly schedule these support requests at available RTS sides during the shorter request schedule window.

The main drawback to this algorithm is the large increase in computational time required when the problem becomes less constrained. By introducing requests with larger time windows, the problem becomes more complex and the CPU time increases. This result is counterintuitive. In other algorithms, like Captain Gooley's insertion and interchange algorithm, making a request less restrictive in where or when it is scheduled makes the scheduling process easier. For the algorithm in this study, CPU times can become unacceptable when requests become more flexible.

V. CONCLUSION AND RECOMMENDATIONS

Conclusion

Satellite Range Scheduling (SRS) involves the matching of a large number of time-specific, resource-particular requests to a limited number of resources. The objective of this research was to develop an automated algorithm to schedule a maximum number of support requests following the priority criteria currently used by RCC schedulers.

Scheduling the maximum number of these requests minimizes the amount of time required by schedulers to resolve schedule conflicts. The complexity of the problem makes a mixed integer program (MIP) for all the support requests over a 24 hour period impractical.

Currently, there is no known way to solve this problem optimally in a timely manner.

By dividing the requests for a 24 hour period into smaller groups of requests and solving smaller MIP problems, good solutions were obtained in a timely manner. Low altitude satellite support requests usually take precedence over the other requests.

Therefore, these support requests are scheduled first. These scheduled support time-RTS side combinations reduce the time available to schedule medium and high altitude satellite supports. There are too many medium and high altitude satellite support requests in a 24 hour period to expect a MIP problem to be solved in a timely manner. These requests were split into two 12 hour blocks. Each time a 12 hour block of requests gets scheduled, the scheduled supports are integrated into the updated fixed schedule and the utilized RTS side times must be subtracted from the next block of support requests to be scheduled.

Schedules were developed for fourteen days of support requests. The algorithm successfully scheduled between 96 and 99 percent of the requested supports. These results do not include RTS down-times or overflow DPAD supports in the schedule.

Because of the flexibility of the algorithm, any time block for a protected RTS down-time or special satellite support can be set aside before a particular problem is solved.

When the RTS turn-around times for the low altitude satellites were lowered from a standard of 20 minutes to zero, the MIP algorithm scheduled more supports. Better scheduling results are expected because the amount of requested RTS time is reduced by more than half. When the RTS turn-around times for the medium and high altitude satellites were lowered from a standard of 15 minutes to eight and zero minutes, the MIP algorithm also generally scheduled more supports.

The SRS algorithm generally completed a 24 hour schedule in under one hour of CPU time. The number of discrete variables in the MIP formulation for the low altitude satellite support requests averaged around 300, with solution times usually lower than ten minutes. The number of discrete variables in the MIP formulation for the 12 hour blocks of medium and high altitude satellite support requests averaged around 800, with solution times usually below 20 minutes.

When the RTS turn-around times were lowered, computational performance improved for the low altitude satellite support requests as solution times dropped and the number of discrete variables remained constant. When the RTS turn-around times were lowered for the medium and high altitude satellite support requests, the solution times generally increased with the number of discrete variables increasing by 5 to 15 percent with each drop in RTS turn-around times.

The MIP solution times can be shortened by lowering the percentage-of-upper bound-solution tolerance that will terminate the MIP solver. Lowering this value may sacrifice a better solution for a shorter CPU time. For most of the MIP models, this value was set at 95 percent of the best known bound on the optimal solution.

Recommendations

The following recommendations are presented in two categories. The first category of recommendations involve improving the scheduling algorithm presented in this study. The second category of recommendations suggests this algorithm be incorporated in different areas of research.

SRS Algorithm Upgrades. As stated earlier, this algorithm does not guarantee a schedule in a reasonable amount of time. Any given block of requests may exhibit sufficient complexity to make required CPU time unacceptable. For the limited data available for this study, the algorithm, as presented, generates promising results. Because of the flexibility of the algorithm, the number of requests considered in one MIP model can be altered by changing the number of hours used to group the requests. This study used a VAX 6420 computer to execute the MIP algorithm in a shared processor configuration. The General Algebraic Modeling System (GAMS) is the software package used as a *front-end processor* for the software used to solve the MIP problem. The MIP solution process is known as the Zero/One Optimization Method (ZOOM). Using a faster, dedicated processor may allow more requests per MIP model to be scheduled in a timely manner.

Splitting the medium and high altitude satellite support requests where a minimum number of satellite support request overlaps per RTS side occurs could increase scheduling performance. Dividing the medium and high altitude support requests into 12 hour blocks limits the number of variables in each MIP model, but also creates a boundary discontinuity. Any time two overlapping requests are divided into two separate MIP formulations the opportunity to optimally schedule the support requests is lost. The request that is placed in the MIP formulation to be done later is not considered when the first request is scheduled. Without some scheduling improvement algorithm, such as Captain Gooley's insertion and interchange algorithm, a request scheduled by a previous

MIP formulation cannot be altered to possibly schedule a latter unscheduled request. This improves the computational performance of the algorithm possibly at the expense of scheduling performance. A discontinuity does not exist if the blocks of requests are split where no overlapping requests exist because every scheduling combination can be considered.

RTS downtimes and scheduling priorities should be determined and included in the scheduling algorithm where appropriate.

A procedure needs to be developed for requests that can be divided into shorter requests such as unprotected RTS downtimes, DPAD overflow supports and long unscheduled requests. An adaptation of Captain Gooley's insertion and interchange algorithm may work well for this problem.

Because RTS turn-around times are often reduced by schedulers in order to schedule a request, the MIP formulation can be changed to schedule as many supports as possible ignoring RTS turn-around times. RTS turn-around times can be added in where possible, up to the nominal requested value. This schedule could be used to identify to schedulers candidate requests for shortened RTS turn-around times.

Alternate SRS Algorithm Functions. This algorithm can be used as a loading model for the AFSCN. Distributions can be developed for low altitude and medium and high altitude satellite support requests at each RTS side. This will allow an analyst to increase the number of requests to determine the number of satellites required to saturate the AFSCN. These distributions would be useful as a test database for testing and validating this and future scheduling algorithms. By varying the number of satellites and RTS sides for a particular situation, a better understanding of the capabilities of the AFSCN may be realized. The effects of losing or adding RTS sides on the AFSCN can be determined as well as the impact of changing the number and type of satellite supports.

RTS utilization was not addressed in this algorithm. This method does not attempt to level RTS utilities across RTS sides or RTSs. Altering the MIP formulation to perform this function is a possible area of additional research.

APPENDIX A

This appendix details the SRS algorithm programs with the outputs used to generate a single day's 24 hour schedule. Many of the programs are revisions of Captain Gooley's work.

SRS Algorithm and Outputs

LREQ.PAS. Low altitude request. This PASCAL program builds a file called **REQLF.DAT** containing the low altitude satellite support requests for a day. The file containing all the requests and visibilities for a seven day period was called **FINLDATA.DFT**.

```
program lreq.pas;
  Type
  Var
  I,j,N,cnt,bv,ev,ailen,req,snumlf,snumhf,irevlf,irevhf,aiday,a : Integer;
  snumdd,times,durlen,schr,scmin,sctot,sitme,atmehrn,atmeminn,bvn,evn : integer;
  error,aihr,sihr,aitmehr,aitmemin,irev,aimin,diff,silen,stm,amin : integer;
  ident,lfidet,hfidet,smon,stme,amon,atme,alen,chk,dur : string[4];
  slen : string[4];
  gts : string[5];
  rev : string[7];
  id,ib,sch,line,sp,s1,s2,s3,s4 : STRING[1];
  scnt,sbv,sev,sailen,nsctot : string[4];
  aday,tat,ahr,amin,atmehr,atmemin,d1,d2,d3,a1,a2 : string[2];
  last : string[3];
  fill : string[32];
  Infile,Infile1,OutFile1,outfile3,outfile4 : Text;
  Begin {Main Program}
    cnt:=0;
    Writeln('Begin Reading Fin.dft');
    Assign(Infile,'a:\finldata.dft');
    Reset(Infile);
    Assign(Outfile,'C:\reqlf.dat');
    Rewrite(Outfile);
    Writeln('Reading Data');
    while NOT EOF(Infile) do
      Begin
        Read (Infile,id,ident,gts,s4,sch,rev,s1,s2,s3,d1,d2,d3,slen,
              amon,atmehr,atmemin,aday,ahr,amin,tat,fill);
          if(s1=*) and (id='P')and (d1='13') and(sch='') then
```

```

begin
      cnt:=cnt+1;
      val(d2,atmehrn,error);
      val(d3,atmeminn,error);
      val(tat,aminn,error);
      bvn:=atmehrn*60+atmeminn;
      evn:=bvn+aminn;
      writeln (outfile,cnt:4,' ',gts,'A',bvn:5,evn:5,aminn:5,' 20 ',ident,rev);
      writeln (outfile,cnt:4,' ',gts,'B',bvn:5,evn:5,aminn:5,' 20 ',ident,rev);
      if gts='POGO-' then writeln (outfile,cnt:4,' ',gts,'C',bvn:5,evn:5,aminn:5,' 20 ',ident,rev);
      end;
      end;
      reset(outfile);
repeat
      readln(outfile);
until EOF (outfile);
      reset(outfile1);
repeat
      readln(outfile1);
until EOF (outfile1);
end.*

```

IPLINK.FOR This FORTRAN program is executed on the VAX 6420. It completes the pre-processing required for input into the GAMS program. The file REQLF.DAT is input and the file NTABLE.DAT is output to the program SRS.GMS.

```

PROGRAM IPLINK
INTEGER I,J,K,REQ,NUM,INDEX,IREV,INREV,SNUM
CHARACTER*1 sc,d
CHARACTER*3 GGTS(18)
CHARACTER*6 GTS,crev,AGS(18)
CHARACTER*4 CBV1,CEV2,CREQ
INTEGER TA,BV,EV,BST,EST,ID,IDENT,csum
INTEGER TO(400),D1,NWI(400)
REAL REV,W(400)
INTEGER R(400,18), X(400,18),ABV(400,18),AEV(400,18)
INTEGER CNT, CNT1
IREV=0.0
OPEN(UNIT=10,FILE='sup2.DAT',STATUS='UNKNOWN')
OPEN(UNIT=21,FILE='re214.DAT',STATUS='UNKNOWN')
OPEN(UNIT=12,FILE='NTABLE2.DAT',STATUS='UNKNOWN')
OPEN(UNIT=22,FILE='avg2.DAT',STATUS='UNKNOWN')
OPEN(UNIT=9,FILE='HOLD2.DAT',STATUS='UNKNOWN')

```

```

I=0
IDENT=0
AGS(1)='POGO-A'
AGS(2)='POGO-B'
AGS(3)='POGO-C'

```

```

    AGS(4)='POGO-D'
    AGS(5)='HULA-A'
    AGS(6)='HULA-B'
    AGS(7)='COOK-A'
    AGS(8)='COOK-B'
    AGS(9)='INDI-A'
    AGS(10)='INDI-B'
    AGS(11)='BOSS-A'
    AGS(12)='BOSS-B'
    AGS(13)='LION-A'
    AGS(14)='LION-B'
    AGS(15)='GUAM-A'
    AGS(16)='GUAM-B'
    AGS(17)='PIKE-A'
    AGS(18)='REEF-A'
    GGTS(1)='P-A'
    GGTS(2)='P-B'
    GGTS(3)='P-C'
    GGTS(4)='P-D'
    GGTS(5)='H-A'
    GGTS(6)='H-B'
    GGTS(7)='C-A'
    GGTS(8)='C-B'
    GGTS(9)='I-A'
    GGTS(10)='I-B'
    GGTS(11)='B-A'
    GGTS(12)='B-B'
    GGTS(13)='L-A'
    GGTS(14)='L-B'
    GGTS(15)='G-A'
    GGTS(16)='G-B'
    GGTS(17)='PI'
    GGTS(18)='REF'
    DO 11 J=1,400
    DO 12 K=1,18
        NWI(J)=0
        X(J,K)=0
        ABV(J,K)=0
        AEV(J,K)=0
        W(J)=0
        R(J,K)=0
        TO(J)=0
12  CONTINUE
11  CONTINUE
C
C READ IN DATA FROM ASCII FILE
C
10  READ(21,FMT=98,ERR=200,END=200) SNUM,GTS,bv,ev,req,
    * TA,IDENT,REV
98  FORMAT(I4,1X,A6,1X,I5,I5,I5,1X,I2,1X,I4,1X,F6.1)

    PRINT *, 'SNUM = ',SNUM,' I = ',I

```

```

      K=0
      DO 35 J = 1,18
        IF (GTS .EQ. AGS(J)) THEN
          K=J
        ENDIF
35    CONTINUE
      IF (K .EQ. 0) GOTO 10
C     IF (REQ .lt. 10) GOTO 10

      FLAG=0
      cnt=1
      cnt1=1
      DO 23 J = 1,400
        IF (NWI(J) .GT. 0) CNT1=cnt1+1

        IF (SNUM .EQ. NWI(J)) THEN
          CNT=J
          FLAG=1
        ENDIF
23    CONTINUE

      IF ( FLAG .EQ. 1) THEN
        I=CNT
      ELSE
        I=cnt1
        NWI(I)=SNUM
      ENDIF

      WRITE(10,99) SNUM,I,GTS
99    FORMAT(I6,2X,I6,1X,A6)
      K=0
      DO 25 J = 1,18
        IF (GTS .EQ. AGS(J)) THEN
          K=J
        ENDIF
25    CONTINUE
      IF (K .EQ. 0) GOTO 10
      X(I,K)=1
      ABV(I,K)=BV
      AEV(I,K)=EV
      TO(I)=15
      R(I,K)=REQ

      IF (I .GE. 85) THEN
        WRITE(9,FMT=98) SNUM,GTS,bv,ev,req,
* TA,IDENT,REV
        GOTO 10

      ENDIF

```

C

```

C READ NEXT RECORD
C
  GOTO 10
C
C CLOSE FILES
C
C
C DETERMINE WEIGHT OF VARIABLE
200 Csum=0
    DO 22 J= 1,I
      SUM=0
      DO 21 K=1,18
        SUM=SUM+X(J,K)
21  CONTINUE
      IF (SUM .GT. 0) THEN
        W(J)=1/sum
      ENDIF
      csum=csum+sum
22  CONTINUE
    write(22,97) i,csum
97  FORMAT(I5,2X, I8)

C
C  WRITE TABLES TO FILE
C  CREATE GTS HEADING
C

```

```

    WRITE(12,102)
102 FORMAT(5X,'SETS')
103 FORMAT(' I supports /1*',I4,'/')
    WRITE(12,103) I
    WRITE (12,900)
900 FORMAT('          ')
    WRITE (12,105)
105 FORMAT(7X,'J GTS')
    DO 19 J = 1,18
      IF (J .EQ. 1) THEN
        WRITE(12,106) GGTS(1)
106  FORMAT(8X,'/',A3)
      ENDIF
      IF (J .EQ. 18) THEN
        WRITE(12,110) GGTS(18)
110  FORMAT(10X,A3,';')
      ENDIF
      IF (J .GT. 1 .AND. J .LT. 18) THEN
        WRITE(12,107) GGTS(J)
107  FORMAT(10X,A3)
      ENDIF
19  CONTINUE
    WRITE (12,900)
    WRITE(12,104)
104 FORMAT(2X,'ALIAS(I,H);')
    WRITE(12,900)

```

```

WRITE(12,991)
991 FORMAT('SET OFFDIAG(I,H);')
WRITE(12,992)
992 FORMAT('OFFDIAG(I,H)=YES$(ORD(I) ne ORD(H))$(ORD(I) LT ORD(H));')
WRITE(12,900)
WRITE(12,997)
997 FORMAT('SCALAR M large positive constant /5000;')
WRITE (12,900)
WRITE (12,201)
201 FORMAT('PARAMETERS')
WRITE (12,900)
WRITE(12,202)
202 FORMAT(' W(I) weight of a support')
DO 49 J = 1 ,I
  IF (J .EQ. 1) THEN
    WRITE (12,203) J, W(J)
203   FORMAT(4X,' ',I4,2X,F4.2)
  ENDIF
  IF (J .GT. 1 .AND. J .LT. I) THEN
    WRITE (12,204) J, W(J)
204   FORMAT(5X,I4,2X,F4.2)
  ENDIF
  IF (J .EQ. I) THEN
    WRITE (12,205) J, W(J)
205   FORMAT(5X,I4,2X,F4.2,' /')
  ENDIF
49 CONTINUE
WRITE (12,900)
WRITE(12,302)
302 FORMAT(' TO(I) turnaround time of a support')
DO 59 J = 1 ,I
  IF (J .EQ. 1) THEN
    WRITE (12,303) J, TO(J)
303   FORMAT(4X,' ',I4,2X,I3)
  ENDIF
  IF (J .GT. 1 .AND. J .LT. I) THEN
    WRITE (12,304) J,TO(J)
304   FORMAT(5X,I4,2X,I3)
  ENDIF
  IF (J .EQ. I) THEN
    WRITE (12,305) J,TO(J)
305   FORMAT(5X,I4,2X,I3,' /;')
  ENDIF
59 CONTINUE
WRITE(12,900)
WRITE(12,900)
WRITE(12,402)
402 FORMAT('TABLE R(I,J) request length supports of i and j')
WRITE(12,900)
DO 48 K=1,1
  WRITE(12,411) (GGTS(J),J=1,11)
411  FORMAT(5X,11A6)
48 CONTINUE

```

```

DO 45 J = 1, I
  WRITE(12,409) J,(R(J,K),K=1,11)
45 CONTINUE
409 FORMAT(I4,1X,11I6)
  DO 46 K=1,1
    WRITE(12,421) (GGTS(J),J=12,18)
421  FORMAT(3X,'+',1X,7A6)
46 CONTINUE
  DO 47 J = 1, I
    WRITE(12,419) J,(R(J,K),K=12,18)
47 CONTINUE
419 FORMAT(I4,1X,7I6)
  WRITE (12,401)
401 FORMAT(2X,',';)
  WRITE(12,900)
  WRITE(12,108)
108 FORMAT('TABLE N(I,J) feasible supports of i and j')
  WRITE(12,900)
  DO 28 K=1,1
    WRITE(12,111) (GGTS(J),J=1,11)
111  FORMAT(5X,11A6)
28 CONTINUE
  DO 29 J = 1, I
    WRITE(12,109) J,(X(J,K),K=1,11)
29 CONTINUE
109 FORMAT(I4,1X,11I6)
  DO 38 K=1,1
    WRITE(12,121) (GGTS(J),J=12,18)
121  FORMAT(3X,'+',1X,7A6)
38 CONTINUE
  DO 39 J = 1, I
    WRITE(12,119) J,(X(J,K),K=12,18)
39 CONTINUE
119 FORMAT(I4,1X,7I6)
  WRITE (12,901)
901 FORMAT(2X,',';)
  WRITE(12,900)
  WRITE(12,508)
508 FORMAT('TABLE BV(I,J) begining of visibility')
  WRITE(12,900)
  DO 52 K=1,1
    WRITE(12,511) (GGTS(J),J=1,11)
511  FORMAT(5X,11A6)
52 CONTINUE
  DO 53 J = 1, I
    WRITE(12,509) J,(ABV(J,K),K=1,11)
53 CONTINUE
509 FORMAT(I4,1X,11I6)
  WRITE(12,900)
  DO 62 K=1,1
    WRITE(12,521) (GGTS(J),J=12,18)
521  FORMAT(3X,'+',1X,7A6)
62 CONTINUE

```

```

DO 63 J = 1, I
  WRITE(12,519) J,(ABV(J,K),K=12,18)
63 CONTINUE
519 FORMAT(I4,1X,7I6)
  WRITE (12,901)
  WRITE (12,900)
  WRITE(12,608)
608 FORMAT('TABLE EV(I,J) ending of visibility')
  WRITE(12,900)
  DO 78 K=1,1
    WRITE(12,611) (GGTS(J),J=1,11)
611 FORMAT(5X,11A6)
  78 CONTINUE
  DO 79 J = 1, I
    WRITE(12,709) J,(AEV(J,K),K=1,11)
  79 CONTINUE
  709 FORMAT(I4,1X,11I6)
  WRITE(12,900)
  DO 88 K=1,1
    WRITE(12,721) (GGTS(J),J=12,18)
  721 FORMAT(3X,'+',1X,7A6)
  88 CONTINUE
  DO 89 J = 1, I
    WRITE(12,719) J,(AEV(J,K),K=12,18)
  89 CONTINUE
  719 FORMAT(I4,1X,7I6)
  WRITE (12,901)
  write(12,900)
  WRITE(12,994)
994 FORMAT('SET D(I,H,J);')
  WRITE(12,995)
995 FORMAT('D(I,H,J)=YES$N(H,J)$N(I,J)$OFFDIAG(I,H)$ (EV(I,J) GT
  *(BV(H,J)-TO(H)));')
412 FORMAT('SET D4(I,H,J);')
415 FORMAT('SET D5(I,H,J);')
410 FORMAT('SET D6(I,H,J);')
416 FORMAT('D4(I,H,J)=YES$D1(I,H,J)$ (NOT(D2(I,H,J)));')
408 FORMAT('D5(I,H,J)=YES$ (NOT(D1(I,H,J)))$D2(I,H,J);')
407 FORMAT('D6(I,H,J)=YES$D1(I,H,J)$D2(I,H,J);')
999 FORMAT('SET D1(I,H,J);')
993 FORMAT('SET D2(I,H,J);')
413 FORMAT('SET D3(I,H,J);')
996 FORMAT('D1(I,H,J)=YES$D(I,H,J)$((BV(H,J)+R(H,J)+TO(I)+R(I,J))
  *LT(EV(I,J)));')
414 FORMAT('D2(I,H,J)=YES$D(I,H,J)$((BV(I,J)+R(I,J)+TO(H)+R(H,J))
  *LT(EV(H,J)));')
998 FORMAT('D3(I,H,J)=YES$D(I,H,J)$ (NOT(D1(I,H,J)))$ (NOT(D2(I,H,J)));')
  WRITE(12,999)
  WRITE(12,996)
  WRITE(12,993)
  WRITE(12,414)
  WRITE(12,413)
  WRITE(12,998)

```

```

WRITE(12,412)
WRITE(12,416)
WRITE(12,415)
WRITE(12,408)
WRITE(12,410)
WRITE(12,407)
WRITE(12,900)
CLOSE(12)
CLOSE(10)
CLOSE(21)

```

```

300 PRINT *, 'NUMBER OF SUPPORT IS', I
END

```

SRS.GMS. This is the GAMS program which models the mixed integer program (MIP) formulation and calls the MIP solver. The output will be two files called **STRT.DAT** and **SCH.DAT** which will be used with the file **SUP.DAT** generated by **IPLINK.FOR** to build a schedule using **SCHUP.PAS**.

```

$include "ntable2.dat"
sets jj(j) dynamic subset of i to hold columns for subtable
      cc(j) dynamic subset of i to hold unprinted columns
      s subtables / 1*12 /;
scalar maxcol;
VARIABLES
ST(I,J) start time for support i at GTS j
X(I,J) support i and GTS j 1 if support occurs 0 otherwise
Y(H,I,J) relax or enforce constraint for supports h i and GTS j
Z total weighted number of supports scheduled
;

```

```

POSITIVE VARIABLE ST;
BINARY VARIABLES X,Y;

```

EQUATIONS

```

SCH obj function - weighted number of supports scheduled
SUPONE(I) schedule support only once
BEGSUP(I,J) schedule support after its beginning visibility
ENDSUP(I,J) schedule support before its end of visibility
NCCSUP1(J,I,H) no concurrent supports on a GTS j ST_i lt ST_j
RELAX1(J,I,H) relax or enforce no concurrent support constraints
RELAX2(J,I,H) relax or enforce no concurrent support constraints
NCCSUP2(J,I,H) no concurrent supports ST i GT ST h
SUP12(J,I,H)
SUP21(J,I,H)
NSUP(J,I,H)
;

```

```

SCH.. Z =E= SUM((I,J)$N(I,J), X(I,J));

SUPONE(I).. SUM(J$N(I,J), X(I,J)) =L= 1;

BEGSUP(I,J)$N(I,J).. ST(I,J) =G= BV(I,J);

ENDSUP(I,J)$N(I,J).. ST(I,J) =L= EV(I,J)-R(I,J);

SUP21(J,I,H)$D4(I,H,J).. ST(I,J) =G= ST(H,J)+R(H,J)
+TO(I)-M*(1-X(I,J))-M*(1-X(H,J));

SUP12(J,I,H)$D5(I,H,J).. ST(I,J)+R(I,J)+TO(H)
=L= ST(H,J) +M*(1-X(I,J))+M*(1-X(H,J));

NCCSUP1(J,I,H)$D6(I,H,J).. ST(I,J) + R(I,J)
+ TO(H) =L= ST(H,J) +M*Y(H,I,J) + M*(1-X(I,J))
+ M*(1-X(H,J));

RELAX1(J,I,H)$D6(I,H,J).. ST(I,J) - ST(H,J) =L= M*Y(H,I,J);

RELAX2(J,I,H)$D6(I,H,J).. ST(H,J) - ST(I,J)
+ .5=L= M*(1-Y(H,I,J));

NCCSUP2(J,I,H)$D6(I,H,J).. ST(I,J) =G= ST(H,J) + R(H,J)
+ TO(I)-M*(1-Y(H,I,J))-M*(1-X(I,J))-M*(1-X(H,J));

NSUP(J,I,H)$D3(I,H,J).. X(I,J)+X(H,J) =L= 1;
MODEL SCHEDULE SRS Scheduling Solution /ALL/;

OPTION ITERLIM=5000000;

OPTION RESLIM=100000;

OPTION OPTCR=0.05;

SOLVE SCHEDULE USING MIP MAXIMIZING Z;

DISPLAY ST.L, X.L;

file res /sch2.dat/;

res.pw = 78;
put res ' table x(i,j) this is a table of scheduled supports';
jj(j) = no;
cc(j) = yes;
loop(s$card(cc),
maxcol=floor(res.pw/7-1);
loop(cc$maxcol,
jj(cc) = yes;
maxcol=maxcol-1);
if((card(cc) ne card(jj)), put // '+':6);

```

```

if((not(card(cc) ne card(j))), put // ' ':6 );
loop(jj, put jj.tl:>5); put /;
loop(i,
  put / i.tl:5;
  loop(jj, put x.L(i,jj):5:1) );
cc(jj) = no;
jj(jj) = no );
put$card(cc) // '**** more than ' card(s):0:0 ' subtables'
/ '**** ' card(cc):0:0 ' columns not written';
abort$card(cc) 'not all columns were printed' , cc;

file res1 /str2.dat/;

res1.pw = 78;

put res1 ' table st(i,j) this is a table of support start times'/;
jj(j) = no;
cc(j) = yes;
loop(s$card(cc),
  maxcol=floor(res1.pw/7-1);
  loop(cc$maxcol,
    jj(cc) = yes;
    maxcol=maxcol-1);
  if((card(cc) ne card(j)), put // '+':6);
  if((not(card(cc) ne card(j))), put // ' ':6 );
  loop(jj, put jj.tl:>5); put /;
  loop(i,
    put / i.tl:5;
    loop(jj, put st.L(i,jj):5:0) );
  cc(jj) = no;
  jj(jj) = no );
put$card(cc) // '**** more than ' card(s):0:0 ' subtables'
/ '**** ' card(cc):0:0 ' columns not written';
abort$card(cc) 'not all columns were printed' , cc;

file res2 /req2.dat/;

res2.pw = 78;

put res2 ' table r(i,j) this is a table of support request times'/;
jj(j) = no;
cc(j) = yes;
loop(s$card(cc),
  maxcol=floor(res2.pw/7-1);
  loop(cc$maxcol,
    jj(cc) = yes;
    maxcol=maxcol-1);
  if((card(cc) ne card(j)), put // '+':6);
  if((not(card(cc) ne card(j))), put // ' ':6 );
  loop(jj, put jj.tl:>5); put /;
  loop(i,
    put / i.tl:5;

```

```

    loop(jj, put R(i,jj):5:0) );
    cc(jj) = no;
    jj(jj) = no );
    put$card(cc) // '**** more than ' card(s):0:0 ' subtables'
    / '**** ' card(cc):0:0 ' columns not written';
    abort$card(cc) 'not all columns were printed' , cc;

```

SCHUP.PAS. Schedule update. This program takes the output from **SRS.GMS** (SCH.DAT and STRT.DAT) and an output from **IPLINK.FOR** (SUP.DAT) and adds it to previously scheduled activities to generate an updated schedule. **SCHUP.PAS** can be ran as many times as required to build a final schedule.

program test;

```

VAR sch: ARRAY [1..18] of string[5];
    strt: ARRAY [1..18] of string[5];

    strn: ARRAY [1..18] of integer;

    SN: ARRAY [1..85] OF INTEGER;
    I,j,CNT,supn,holdn,ACTN,lo1n,lo2n,act1n,stnn,strtn,strttn,strtn,endn,stm, NUM: integer;
    hfn,bvn,evn,durn,tatn,hfn1,bvn1,evn1,durn1,tatn1 : integer;
    waste: string[80];
    GTS,gts1: STRING[7];
    fill: string[11];
    sup: string[6];
    fill1: string[11];
    hold: string[8];
    lo2,lo1,b : string[2];
    act,bs : string[3];
    act1: string[4];
    INFILE,infile2,outfile,outfile1,outfile3,srsfile,outfile2,infile1 : TEXT;
TYPE
    GRND= STRING[6];
    SRS= RECORD
        GTS : GRND;
        BV : INTEGER;
        EV : INTEGER;
        REQ : INTEGER;
        TOT : INTEGER;
        IRON: INTEGER;
        REV : REAL;
    END;
VAR
    ABV,AEV,TA,RE,ID,SU : INTEGER;
    REVV : REAL;
    TGTS: GRND;
    CH: STRING[1];

```

```

BEGIN
WRITELN('WHERE IS OPT FILE FROM IE NDAYLF');
  CNT:=0;
  ASSIGN(SRSFILE,'a:\SCH2.DAT');
  RESET(SRSFILE);
  ASSIGN(INFILE,'a:\STRT2.DAT');
  RESET(INFILE);
  assign(infile1,'a:\re114.dat');
  reset(infile1);
  assign(outfile1,'c:\fs14.dat');
  reset(outfile1);
  assign(outfile3,'c:\fs14.dat');
  assign(infile2,'a:\sup2.dat');
  reset(infile2);
  assign(outfile2,'c:\trash1.dat');
  rewrite(outfile2);
  assign(outfile,'c:\trash2.dat');
  rewrite(outfile);
  WHILE NOT EOF(SRSFILE) DO
  BEGIN
    for i:= 1 to 16 do
      READ(SRSFILE,sch[i]);
    for i:= 1 to 16 do
      READ(infile,strt[i]);
    readln(srsfile,sch[17]);
    readln(infile,strt[17]);
    for i:= 1 to 16 do
      val(strt[i],strn[i],j);
    IF sch[1]='1 ' THEN cnt:=cnt+1;

    IF CNT=1 THEN
    BEGIN
      FOR i:=2 TO 11 DO
        if sch[i]=' 1.0'then writeln(outfile,sch[1],i-1,strn[i]:5);
        end;
        if cnt=2 then
        begin
          for i:=2 TO 11 DO
            if sch[i]=' 1.0'then writeln(outfile,sch[1],(i+9),strn[i]:5);
          end;

          end;

          for cnt:=1 to 200 do
          begin
            reset(infile2);
            repeat
              readln(infile2,sup,hold,fill);
              val(hold,holdn,j);
              val(sup,supn,j);
            until (holdn>=cnt)or(eof(infile2));

```

```

reset(outfile);
repeat
readln(outfile, stn[2], fill1);

    if cnt=stn[2] then writeln(outfile2, supn:5, fill1);
    until eof(outfile);
end;

rewrite(outfile);
cnt:=0;
reset(outfile2);
repeat
readln(outfile2, actn, stn, strtn);

    if (cnt=0) or (cnt<actn) then cnt:=actn;

reset(infile1);
repeat
readln(infile1, act1, gts, stn[1], stn[2], stn[3], fill);

val(act1, act1n, i);
until (actn=act1n) or eof(infile1);

if stn=1 then gts:=' POGO-A ';
if stn=2 then gts:=' POGO-B ';
    if stn=3 then gts:=' POGO-C ';
if stn=5 then gts:=' HULA-A ';
    if stn=6 then gts:=' HULA-B ';
if stn=7 then gts:=' COOK-A ';
    if stn=8 then gts:=' COOK-B ';
if stn=9 then gts:=' INDI-A ';
    if stn=10 then gts:=' INDI-B ';
if stn=11 then gts:=' BOSS-A ';
    if stn=12 then gts:=' BOSS-B ';
if stn=13 then gts:=' LION-A ';
    if stn=14 then gts:=' LION-B ';
if stn=15 then gts:=' GUAM-A ';
    if stn=16 then gts:=' GUAM-B ';
if stn=17 then gts:=' PIKE-A ';
if stn=18 then gts:=' REEF-A ';
if cnt=actn then
    BEGIN

endn:=strtn+stn[3];
WRITELN(OUTFILE, actn:3, gts, strtn:5, endn:5, stn[3]:5, FILL);

CNT:=actn+1;
END;

until eof(outfile2);
reset(outfile);
rewrite(outfile2);

```

```

repeat
readln(outfile,hfn,gts,bvn,evn,durn,tatn,fill);
  writeln(outfile2,hfn:4,gts,bvn:5,evn:5,durn:5,tatn:3,fill);
  until eof(outfile);
  repeat
    readln(outfile1,hfn1,gts1,bvn1,evn1,durn1,tatn1,fill1);
    writeln(outfile2,hfn1:4,gts1,bvn1:5,evn1:5,durn1:5,tatn1:3,fill1);
    until eof(outfile1);
    rewrite(outfile3);
    reset(outfile2);
    for i:=-60 to 1500 do
    begin
      reset(outfile2);
      repeat
        readln(outfile2,hfn,gts,bvn,evn,durn,tatn,fill);

        if bvn=i then writeln(outfile3,hfn:4,gts,bvn:5,evn:5,durn:5,tatn:3,fill);

      until eof(outfile2);
      end;
      reset(outfile);
      repeat
        readln(outfile);
        until eof(outfile);
        reset(outfile2);
        repeat
          readln(outfile2);
          until eof(outfile2);
          reset(outfile3);
          repeat
            readln(outfile3);
            until eof(outfile3);
          end.

```

SCHUP.PAS Output (Low Altitude Satellite Schedule).

1 INDI-A 13 28 15 15 6553055	17 INDI-A 179 195 16 15 9757024
2 POGO-A 26 42 16 15 2532097	18 REEF-A 193 207 14 15 1132085
3 BOSS-A 39 55 16 15 9757024	19 POGO-A 217 233 16 15 9845009
4 POGO-B 51 64 13 15 1056014	20 LION-A 225 239 14 15 6553055
5 COOK-A 54 67 13 15 4774042	21 POGO-B 226 242 16 15 3187074
6 COOK-B 54 68 14 15 6553055	22 POGO-C 234 248 14 15 6553055
7 REEF-A 81 93 12 15 9757024	23 PIKE-A 238 253 15 15 7050006
8 GUAM-A 108 123 15 15 7050006	24 HULA-A 238 254 16 15 0286045
9 BOSS-A 117 133 16 15 2532097	25 LION-B 244 257 13 15 1056014
10 POGO-B 138 152 14 15 6553055	27 POGO-A 268 279 11 15 4774042
11 PIKE-A 138 154 16 15 9757024	28 LION-A 271 284 13 15 1132085
12 HULA-A 139 153 14 15 0286045	29 LION-A 325 336 11 15 6553055
13 POGO-C 150 163 13 15 1056014	30 POGO-A 326 342 16 15 3187074
14 BOSS-A 163 175 12 15 5821064	31 POGO-B 331 345 14 15 6553055
15 POGO-A 169 179 10 15 4774042	32 HULA-A 335 351 16 15 9757024
16 GUAM-A 173 187 14 15 1056014	33 HULA-B 335 351 16 15 9757024

34 BOSS-A 340 355 15 15 1056014
 35 COOK-A 349 364 15 15 1132085
 36 GUAM-A 355 369 14 15 6553055
 37 POGO-A 364 376 12 15 0286045
 38 LION-A 365 381 16 15 9757024
 39 POGO-B 367 379 12 15 4774042
 40 HULA-A 413 430 17 15 2532097
 41 BOSS-A 421 434 13 15 6553055
 42 POGO-A 426 443 17 15 3187074
 43 PIKE-A 440 454 14 15 1056014
 44 COOK-A 441 452 11 15 7050006
 45 POGO-B 449 466 17 15 1056014
 46 LION-A 466 482 16 15 9757024
 47 POGO-A 466 480 14 15 0286045
 48 BOSS-A 475 487 12 15 4774042
 49 REEF-A 480 496 16 15 1056014
 50 HULA-A 515 527 12 15 2532097
 51 POGO-C 527 543 16 15 3187074
 52 GUAM-A 535 550 15 15 9757024
 53 PIKE-A 539 556 17 15 1056014
 54 POGO-A 551 567 16 15 1056014
 55 HULA-A 551 561 10 15 6790043
 56 POGO-B 559 575 16 15 9757024
 57 POGO-C 567 583 16 15 0286045
 58 BOSS-B 571 586 15 15 4774042
 59 REEF-A 582 596 14 15 1056014
 60 PIKE-A 614 629 15 15 6553055
 61 BOSS-A 619 635 16 15 3187074
 62 POGO-A 625 639 14 15 6553055
 63 REEF-A 632 644 12 15 4774042
 64 GUAM-A 636 651 15 15 9757024
 65 POGO-B 638 651 13 15 2532097
 66 POGO-C 653 669 16 15 1056014
 67 POGO-A 660 674 14 15 4774042
 68 LION-A 665 678 13 15 1056014
 69 BOSS-B 668 683 15 15 1132085
 71 BOSS-A 670 686 16 15 9757024
 72 REEF-A 728 742 14 15 4774042
 73 HULA-A 736 752 16 15 1056014
 74 HULA-B 736 752 16 15 1056014
 75 POGO-A 739 753 14 15 2532097
 76 POGO-B 756 772 16 15 1056014
 77 POGO-C 757 771 14 15 4774042
 78 BOSS-A 769 783 14 15 1132085
 79 BOSS-B 771 786 15 15 9757024
 80 HULA-A 807 820 13 15 6553055
 81 HULA-B 807 820 13 15 6553055
 82 REEF-A 831 847 16 15 9757024
 83 POGO-B 834 848 14 15 3187074
 84 LION-B 845 857 12 15 4774042
 85 BOSS-A 848 863 15 15 2532097
 86 POGO-A 854 868 14 15 4774042
 87 LION-A 867 882 15 15 1056014

88 COOK-A 874 890 16 15 9757024
 89 HULA-A 904 917 13 15 6553055
 90 LION-A 907 922 15 15 7050007
 91 LION-B 933 947 14 15 6553055
 92 REEF-A 933 946 13 15 9757024
 93 GUAM-A 935 951 16 15 1056014
 94 POGO-A 939 950 11 15 3187074
 96 BOSS-A 970 983 13 15 1056014
 97 HULA-A 970 981 11 15 4774042
 98 HULA-B 970 981 11 15 4774042
 99 POGO-A 971 987 16 15 0286045
 100 COOK-A 975 989 14 15 9757024
 101 LION-B 1010 1025 15 15 7050007
 102 HULA-A 1020 1036 16 15 3187074
 103 POGO-A 1024 1036 12 15 6553055
 104 INDI-A 1025 1039 14 15 1132085
 105 GUAM-B 1039 1050 11 15 1056014
 106 LION-A 1039 1052 13 15 4774042
 107 POGO-C 1047 1061 14 15 4774042
 108 LION-B 1052 1063 11 15 9757024
 109 POGO-B 1062 1074 12 15 9757024
 110 BOSS-A 1070 1086 16 15 1056014
 111 POGO-A 1071 1087 16 15 0286045
 112 HULA-A 1079 1095 16 15 9757024
 113 HULA-B 1079 1095 16 15 9757024
 114 GUAM-A 1098 1112 14 15 6553055
 115 BOSS-B 1099 1114 15 15 7050007
 116 POGO-A 1123 1136 13 15 6553055
 117 LION-B 1129 1138 9 15 6553055
 118 BOSS-A 1138 1149 11 15 4774042
 119 POGO-B 1145 1158 13 15 3187074
 120 LION-A 1150 1166 16 15 9757024
 121 POGO-A 1161 1174 13 15 9757024
 122 GUAM-A 1168 1181 13 15 4774042
 123 HULA-A 1169 1181 12 15 1132085
 124 POGO-C 1171 1188 17 15 0286045
 125 PIKE-A 1172 1188 16 15 1056014
 126 COOK-A 1192 1206 14 15 7050007
 127 POGO-B 1221 1235 14 15 6553055
 128 HULA-A 1222 1234 12 15 6790043
 129 REEF-A 1231 1248 17 15 1056014
 130 BOSS-A 1232 1247 15 15 4774042
 131 POGO-A 1247 1262 15 15 3187074
 132 LION-A 1252 1267 15 15 9757024
 133 HULA-A 1257 1268 11 15 2532097
 134 POGO-B 1260 1274 14 15 9757024
 135 BOSS-B 1264 1280 16 15 0286045
 136 COOK-A 1274 1290 16 15 1056014
 137 GUAM-A 1283 1299 16 15 9757024
 138 COOK-B 1293 1308 15 15 7050007
 139 POGO-A 1318 1333 15 15 6553055
 140 BOSS-A 1327 1340 13 15 6553055
 141 INDI-A 1333 1349 16 15 1056014

142 POGO-B 1335 1351 16 15 2532097
 143 POGO-C 1349 1365 16 15 3187074
 144 BOSS-B 1352 1364 12 15 9757024
 145 POGO-A 1359 1375 16 15 9757024
 147 GUAM-A 1366 1380 14 15 1132085
 148 BOSS-A 1366 1380 14 15 0286045

149 REEF-A 1370 1384 14 15 4774043
 150 INDI-A 1389 1401 12 15 6553055
 151 COOK-B 1426 1441 15 15 4774043
 152 COOK-A 1428 1443 15 15 6553055
 153 BOSS-A 1428 1442 14 15 2532097

HREQ.PAS. High request. This program will build two files containing 1) the high altitude requests for a day (REQHF.DAT), and 2) the visibilities for the high altitude requests for a day (DIV.DAT).

```

program hreq;
  Type
    mat = array[1..80] of string[1];
  Var
    I,j,N,cnt,bv,ev,ailen,req,numlf,numhf,irevlf,irevhf,aiday,a : Integer;
    numdd,times,durlen,schr,scmin,sctot,sitme,atmehrn,atmeminn,bvn,evn : integer;
    error,aihr,sihr,aitmehr,aitmemin,irev,aimin,diff,silen,stm,amin : integer;
    ident,lfidnt,hfidnt,smon,stme,amon,atme,alen,chk,dur : string[4];
    slen : string[4];
    gts : string[5];
    rev : string[7];
    id,ib,sch,line,sp,s1,s2,s3,s4 : STRING[1];
    scnt,sbv,sev,sailen,nsctot : string[4];
    aday,tat,ahr,amin,atmehr,atmemin,d1,d2,d3,a1,a2 : string[2];
    last : string[3];
    fill : string[32];
    Infile,Infile1,OutFile1,outfile,outfile3,outfile4 : Text;
    stats : mat;
  Match :boolean;
  Begin {Main Program}
    cnt:=0;
    Writeln('Begin Reading Fin.dft');
    Assign(Outfile1,'c:\reqhf.dat');
    Rewrite(Outfile1);
    Assign(Outfile4,'C:\d1v.dat');
    Rewrite(Outfile4);
    Assign(Infile1,'a:\finldata.dft');
    Reset(Infile1);
    Writeln('Reading Data');
    Writeln('Reading Data');
    While NOT EOF(Infile1) do
      Begin
        for i:=1 to 80do Read(Infile1,stats[i]);
        s1:='1';
        s2:='3';
        if (stats[1]='P')and((stats[24]=s2)or(stats[24]='2')) then for i:=1 to 80do write(outfile4,stats[i]);
        while ((stats[1] = 'P') and (stats[23]=s1)and (stats[24]=s2)) and
          (stats[12]=' ') do

```

```

begin
  if (stats[20] < '*') then for i:=1 to 48 do write (outfile1, stats[i]);
  for i:=1 to 80 do Read(infile1, stats[i]);
    repeat
      begin
        if stats[1]='L' then for i:=1 to 12 do write (outfile1, stats[i]);
        if ((stats[6]='D') and (stats[7]='P')) or ((stats[11]='D') and (stats[12]='P')) or ((stats[16]='D') and
        (stats[17]='P')) or ((stats[21]='D') and (stats[22]='P')) or ((stats[26]='D') and (stats[27]='P')) or
        ((stats[31]='D') and (stats[32]='P')) then write (outfile1, 'DPAD');
          for i:=1 to 80 do Read(infile1, stats[i]);
        end;
      until stats[1]='P';
      writeln (outfile1, 'new');
    end;
  end;
  reset(outfile1);
  repeat
    readln(outfile1);
  until EOF (outfile1);
end.

```

HREQ.PAS Output (High Altitude Requirements).

```

P5329REEF-A 00001.0 101208350000201011115010050L TS      new
P5329INDI-A 00001.0 101203250000201011115010050L 0325-0410 new
P9445HULA-A 00000.0 1012000000003510111150010035L 00+/-15 new
P9445HULA-A 00000.0 1012061000002510111150010035L 06+/-15 new
P7310COOK-B 00397.0 1012001500001010111415001110L 0015+/-10 new
P2567REEF-A 00001.0 1012003000001510111655001114L 00+30-00 new
P7506POGO-B 05624.0 1012022500001510111700001020L 0235+/-10 new
P7225GUAM-B 08403.0 1012033500001510111717001125L 0335+/-10 new
P7225POGO-D 08403.0 1012001000020510111809000945DPADnew
P0470POGO-B 00001.0 1012010000001510112025000523L 0045+30-00new
P7304BOSS-B 06743.0 1012064500001510112113001009L 0645+00-10new
P6142HULA-B 00001.0 1012030000002510112204000901L 03+30-00 new
P3055REEF-A 00001.0 1012062500001510112231001000L 06+30-00 new
P8639COOK-A 00001.0 1012014500001510112251000558L 0145-0230 new
P8639PIKE-A 00001.0 1012003000004510112309000513L TS      new
P1920BOSS-A 00001.0 1012040000001510112313000729L 04+30-00 new
P6012HULA-A 03718.0 1012091500002510112325001119L 0915+00-10new
P6012HULA-B 03718.0 1012010000005510112325001119DPADnew
P6012COOK-B 03718.0 1012015500025510112346001042DPADL TS      new
P9521POGO-B 00001.0 1012012000001510112351000417L 0105-0150 new
P6280BOSS-A 00000.0 1012153000000510120000010000L 1530+/-30 new
P7314COOK-B 00000.0 1012202000001510120000010000L 2020+/-30 new
P9366LION-A 00000.0 1012103000000510120000010000L 1015+/-15 new
P9366LION-A 00000.0 1012203000000510120000010000L 2045+/-30 new
P6453COOK-A 00000.0 1012021500001510120000010000L 02+/-30 new
P9446REEF-A 00000.0 1012170000000510120000010000L 17+/-30 new
P8275BOSS-A 00000.0 1012141500001510120000010000L 1415+/-30 new
P5775GUAM-A 00001.0 1012163000002010120000010000L 1630-1730 new
P5775GUAM-A 00001.0 1012233000002010120000010000L 2330-0000 new
P2124BOSS-A 00001.0 1012043000002010120000010000L 0430-0615 new

```

P2124LION-A 00001.0 1012093000002010120000010000L 0930-1115 new
 P2124BOSS-B 00001.0 1012170000002010120000010000L 1700-1800 new
 P3160REEF-A 00001.0 1012053000002010120000010000L 0530-0630 new
 P3160GUAM-B 00001.0 1012143000002010120000010000L 1430-1530 new
 P3160REEF-A 00001.0 1012214000002010120000010000L 2100-2200 new
 P3160GUAM-A 00001.0 1012223000002010120000010000L 2230-2330 new
 P5953GUAM-B 00001.0 1012003500002010120000010000L 0030-0130 new
 P5953COOK-B 00001.0 1012164500002010120000010000L 1630-1730 new
 P5329INDI-A 00001.0 1012180000002010120000010000L TS new
 P6392BOSS-B 00000.0 1012033000000510120000010000L 0330+/-30 new
 P6392INDI-A 00000.0 1012161500001010120000010000L 1635+/-30 new
 P8275COOK-A 00000.0 1012002500000510120000010000L 0030+/-30 new
 P6071BOSS-B 00000.0 1012121500000510120000010000L 1235+/-30 new
 P6071HULA-B 00000.0 1012223500001010120000010000L 2235+/-30 new
 P6280INDI-A 00000.0 1012050000001010120000010000L 0520+/-30 new
 P6394COOK-B 00000.0 1012175000000510120000010000L 1745+/-30 new
 P6391INDI-A 00000.0 1012070500013010120000010000L TS new
 P9364LION-A 00000.0 1012121500003010120000010000L TS new
 P9364COOK-B 00000.0 1012181500001510120000010000L 1830+/-30 new
 P9366BOSS-A 00000.0 1012144500000510120000010000L 1445+/-30 new
 P0712BOSS-B 00000.0 1012031000001010120000010000L 0315+/-30 new
 P0712LION-A 00000.0 1012091000000510120000010000L 0915+/-30 new
 P9443GUAM-A 00000.0 1012135500001510120000010000L 14+/-30 new
 P9442INDI-A 00000.0 1012020000001010120000010000L 02+/-30 new
 P9444REEF-A 00000.0 1012144000003510120000010000L 1440+/-15 new
 P5037LION-A 00000.0 1012004500071510120000010000new
 P5037LION-A 00000.0 1012010000050010120000010000L TS new
 P5037LION-A 00000.0 1012110000001010120000010000new
 P5037LION-A 00000.0 1012143000001010120000010000L 15+/-30 new
 P5037LION-A 00000.0 1012193000001010120000010000L 19+/-30 new
 P5037LION-A 00000.0 1012233500002010120000010000new
 P4845INDI-A 00000.0 1012054000000510120000010000L 06+/-30 new
 P4845LION-A 00000.0 1012180000000510120000010000L 18+/-30 new
 P4955LION-B 00000.0 1012132000001010120000010000L TS new
 P4955INDI-A 00000.0 1012005400001010120000010000L TS new
 P4035BOSS-A 00000.0 1012053000001010120000010000L 0530+/-10 new
 P4035LION-A 00000.0 1012213000001010120000010000L 2130+/-10 new
 P4845INDI-A 00000.0 1012234500001010120000010000L 2345+/-30 new
 P9363HULA-B 00000.0 1012100000001010120000010000L 10+/-1 new
 P4035BOSS-B 00000.0 1012010000002510120000010000L TS new
 P4035BOSS-B 00000.0 1012092500001010120000010000L 0930+/-10 new
 P6280BOSS-B 00000.0 1012000000000510120000010000new
 P5329INDI-A 00001.0 1012154000002010120000010000L 1535-1610 new
 P5953COOK-A 00001.0 1012090000002010120000010000L 0830-0930 new
 P6394COOK-A 00000.0 1012083500001010120000010000new
 P6451COOK-A 00000.0 1012112500001510120000010000L 1130+/-30 new
 P9445GUAM-A 00000.0 1012120000002510120000010000L 12+/-15 new
 P5775REEF-A 00001.0 1012113000002010120000010000L 1130-1200 new
 P5775GUAM-B 00001.0 1012135000002010120000010000L TS new
 P4832REEF-A 00000.0 1012091000001010120000010000L 0930+/-30 new
 P9446LION-B 00000.0 1012095000001510120000010000L 10+/-30 new
 P4845LION-B 00000.0 1012121100001010120000010000L 1211+/-30 new
 P4035LION-A 00000.0 1012134000001010120000010000L 1330+/-10 new

P4524BOSS-B 00000.0 1012043000001510120000010000L 0420+/-30 new
 P9366PIKE-A 00000.0 1012015100001510120000010000L TS new
 P5775REEF-A 00001.0 1012070000001510120000010000L TS new
 P9441BOSS-B 00000.0 1012040000001510120000010000L 04+/-30 new
 P6071PIKE-A 00000.0 1012055800005710120000010000L TS new
 P5775GUAM-A 00001.0 1012081000002010120000010000L TS new
 P7314COOK-B 00000.0 1012131000000510120000010000L 1310+/-30 new
 P6453HULA-B 00000.0 1012102500000510120000010000L 1020+/-30 new
 P6451HULA-B 00000.0 1012043000000510120000010000L 0415+/-30 new
 P5775REEF-A 00001.0 1012020000002010120000010000L 0130-0230 new
 P5775GUAM-A 00001.0 1012042500002010120000010000L TS new
 P4035LION-B 00000.0 1012024500000510120000010000new
 P9364BOSS-A 00000.0 1012090000001010120000010000L 09+30-15 new
 P2124LION-B 00001.0 1012124000002010120000010000L 1230-1330 new
 P9443HULA-A 00000.0 1012183000001010120000010000new
 P7314BOSS-A 00000.0 1012062000000510120000010000L 0615+/-30 new
 P6391BOSS-B 00000.0 1012001000001010120000010000new
 P6391LION-A 00000.0 1012130000000510120000010000new
 P4524LION-B 00000.0 1012114500001010120000010000L 12+/-30 new
 P4035INDI-A 00000.0 1012173500001010120000010000L 1730+/-10 new
 P2124BOSS-B 00001.0 1012231500002010120000010000L 2300-0000 new
 P9434COOK-B 00000.0 1012184500001510120000010000L 19+/-30 new
 P0712LION-A 00000.0 1012220000001510120000010000L 22+/-30 new
 P7641PIKE-A 00001.0 1012180000002010120000010000L 1800-1900 new
 P6453GUAM-B 00000.0 1012171500000510120000010000L 1715+/-30 new
 P5775GUAM-A 00001.0 1012182500014010120000010000L TS new
 P4832INDI-A 00000.0 1012201000001010120000010000L TS new
 P9444REEF-A 00000.0 1012210000002510120000010000L 21+/-15 new
 P4524BOSS-B 00000.0 1012192500000510120000010000L 1915+/-30 new
 P6391INDI-A 00000.0 1012191000001010120000010000L 1920+/-30 new
 P8275COOK-B 00000.0 1012231500000510120000010000L 2315+/-30 new
 P6451COOK-B 00000.0 1012194500000510120000010000L 1945+/-30 new
 P5329LION-A 00001.0 1012223500003510120000010000new
 P3160GUAM-B 00001.0 1012025000002010120000010000new
 P6012POGO-A 03718.0 1012045000041010120005000948DPADL TS new
 new
 new
 new
 P6374INDI-A 00001.0 1012085000001510120043001104new
 new
 new
 new
 new
 new
 new
 new
 new
 P7837GUAM-B 02004.0 1012011000003510120106001128L TS new
 new
 new
 new
 new
 new
 new
 P4373REEF-A 00001.0 1012060500001510120232001110L 0600-0645 new
 new
 P7310POGO-B 00398.0 1012120500001010120244001005L 1215+/-10 new

P7310POGO-B 00398.0 1012025500002010120244001005L 0245+/-10 new
 new
 new
 new
 P7310BOSS-B 00398.0 1012072000001010120310000915L 0735+/-45 new
 new
 P3028PIKE-A 00001.0 1012050000004510120321000642new
 new
 P8896REEF-A 00001.0 1012034500004010120342001109L 0325+30-00new
 L S3O new
 new
 P3726INDI-A 03010.9 1012035500004510120350001136new
 new
 P3726INDI-A 03010.9 1012121000031510120357001129new
 new
 new
 new
 new
 P3726GUAM-B 03010.9 1012042500080010120420000828new
 P7506HULA-B 05625.0 1012050000001010120422001126L 05+/-10 new
 new
 new
 P7506SUN3-A 05625.0 1012062500071010120433001109DPADL TS new
 P7506POGO-B 05625.0 1012142000001510120500001017L 1430+/-10 new
 L S3O new
 new
 P2524PIKE-A 00001.0 1012110000004510120528000716L TS new
 new
 P7225BOSS-B 08404.0 1012061000001010120534001042L 06+/-10 new
 P7225BOSS-B 08404.0 1012083500001010120534001042L 0835+/-10 new
 P7225BOSS-C 08404.0 1012072000025510120534001042DPADnew
 P7225BOSS-C 08404.0 1012110000031010120534001042DPADnew
 P7225BOSS-B 08404.0 1012154000001510120534001042L 1530+/-10 new
 new
 new
 new
 new
 new
 new
 new
 new
 P2272LION-B 00001.0 1012070000001510120637000334L 07+30-00 new
 P2567PIKE-A 00001.0 1012075500004510120640000753new
 new
 P7225COOK-A 08404.0 1012101500004510120655000755DPADnew
 L SEND L SEND new
 new
 new
 new
 new
 P8896POGO-B 00001.0 1012095000004010120732000407L 0935+30-00new
 new
 new

new
 new
 P7304INDI-A 06744.0 1012194500000710120822001133L TS new
 P7304INDI-A 06744.0 1012114000001010120822001133L 1140+/-10 new
 new
 P7304LION-A 06744.0 1012100500001010120838001055L TS new
 P7304LION-B 06744.0 1012092000001510120838001055L TS new
 new
 new
 new
 new
 new
 P7304POGO-D 06744.0 1012102500022510120912000958DPADL TS new
 P7304POGO-B 06744.0 1012184500001510120912000958L 1845+00-10new
 new
 new
 new
 P7304BOSS-C 06744.0 1012144500025010120936000911DPADnew
 new
 new
 new
 new
 new
 new
 new
 P9783POGO-B 00001.0 1012113000001510121037000442L 11+30-00 new
 new
 new
 new
 new
 new
 new
 new
 P5329REEF-A 00001.0 1012231000005510121118010044new
 P3310HULA-B 00001.0 1012140000001510121128000842L 14+30-00 new
 P6012LION-A 03719.0 1012113000003510121129001101L 1140+0/-10new
 P5681PIKE-A 00001.0 1012141500004510121141000716L TS new
 P6012INDI-A 03719.0 1012223500001310121144001105L TS new
 P6012POGO-D 03719.0 1012130000080010121149001014DPADL TS new
 P6012POGO-B 03719.0 1012211500002510121149001014L 2115+00-10new
 new
 new
 new
 new
 new
 P7304COOK-A 06744.0 1012125000015510121220000433DPADnew
 new
 new
 new
 new
 P7837BOSS-A 02005.0 1012132000003510121314001104L TS new
 new
 new
 P3028BOSS-B 00001.0 1012150000001510121348000421L 15+30-00 new
 new

new
 P3310PIKE-A 00001.0 1012151500004510121358000540L TS new
 P6738COOK-B 00001.0 1012172000001510121359000546L 1700-1745 new
 new
 new
 new
 new
 P5681LION-B 00001.0 1012161500001510121433000532L 1615+30-00new
 new
 P7310POGO-B 00399.0 1012145000002010121439001013L 1440+/-10 new
 P7310BOSS-B 00399.0 1012194500001010121440001015L 1935+/-45 new
 P2941GUAM-B 00001.0 1012190000001510121455000912L 19+30-00 new
 P3726GUAM-B 03011.2 1012151000004510121502000058new
 new
 new
 new
 new
 new
 new
 new
 P3726BOSS-A 03012.0 1012164000110010121600010000new
 P3726PIKE-A 03012.0 1012220000024510121600010000new
 P8896HULA-B 00001.0 1012213000004010121601000636L 2130+30-00new
 new
 new
 new
 new
 new
 P4373PIKE-A 00001.0 1012164500004510121617000739L TS new
 new
 P7506POGO-B 05626.0 1012171000001010121656001020L 17+/-10 new
 P7506POGO-B 05626.0 1012193500001010121656001020L 1935+/-10 new
 new
 new
 new
 P7506BOSS-C 05626.0 1012182500064010121708000958DPADL TS new
 P7225GUAM-A 08405.0 1012180000001010121713001124L 18+/-10 new
 new
 new
 new
 P8896PIKE-A 00001.0 1012182500004510121729000750new
 new
 new
 P2524POGO-B 00001.0 1012180000001510121743000428L 1800-1845 new
 P7225SUN3-A 08405.0 1012192000025510121749001027DPADL TS new
 new
 new
 P7225COOK-C 08405.0 1012221500035510121751001024DPADL TS new
 new
 new
 new
 new
 new


```

program tol;
Type
  mat = array[1..40, 1..3] of Integer;
Var
  f15,f16,f110,f111,d12,d14,f17,f112,hfn : integer;
  I,j,N,cnt,bv,ev,ailen,req,snumlf,snumhf,irevlf,irevhf,aiday : Integer;
  snumdd,times,durlen,schr,scmin,sctot,sitme,time1,time2,f13,f14,f18,f19 : integer;
  error,aihr,sibr,aitmehr,aitmemin,irev,aimin,diff,silen,stm,d13,d16 : integer;
  ident,lfident,hfident,smon,stme,atme,alen,chk,dur,t1,t2 : string[4];
  rev,gts : string[6];
  id,ib,sch,line,sp,s1,s2,s3,s4,f1,f2,f3,f4,f5,f6,f7,f8,f9,f10,f11,f12 : STRING[1];
  scnt,sbv,sev,sailen,nsctot,slen : string[4];
  aday,tat,ahr,amin,atmehr,atmemin,d1,d2,d3,d4,d5,d6,d7 : string[2];
  last,hf : string[3];
  fill : string[32];
  fill2 : string[24];
  revv,revlf,revhf : real;
  dum:STRING[9];
  Infile,Infile1,OutFile1,outfile2,outfile3,outfile : Text;
  stats : mat;
  Match :boolean;
Begin {Main Program}
  hfn:=0;
  sp:=' ';
  chk:=' ';
  cnt:=0;
  snumlf:=1;
  snumhf:=300;
  irevlf:=0;
  irevhf:=9999;
  lfident:=' ';
  hfident:=' ';
  Writeln('Begin Reading Fin.dft');
  Assign(Infile,'c:\reqhf.dat');
  Reset(Infile);
  Assign(outfile1,'c:\d12lf.dat');
  Rewrite(outfile1);
  Assign(Outfile2,'C:\hf12.dat');
  Rewrite(Outfile2);
  Assign(Outfile3,'C:\dpad.dat');
  Rewrite(Outfile3);
  Assign(Outfile,'C:\raw12.dat');
  Rewrite(Outfile);
  Writeln('Reading Data');
  while NOT EOF(Infile) do
    Begin
      readln (infile,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,d2,d4,d5,
        d3,d6,d7,atmehr,atmemin,aday,ahr,amin,tat,f1,f2,
        f3,f4,f5,f6,f7,f8,f9,f10,f11,f12);
        val(f3,f13,error);
        val(f4,f14,error);

```

```

val(f8,f18,error);
val(f9,f19,error);
val(f7,f17,error);
val(f5,f15,error);
val(f6,f16,error);
val(f10,f110,error);
val(f11,f111,error);
val(d2,d12,error);
val(d4,d14,error);
val(f12,f112,error);
val(d3,d13,error);
val(d6,d16,error);
if f1='D' then writeln (outfile3,cnt,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,
d2,d4,d5,d3,d6,d7,atmehr,atmemin,aday,ahr,amin,tat,' ',time1:4);
if (f3='T') or (f1='n') then
begin
time1:=d12*60+d14;
time2:=time1+d13*60+d16;
cnt:=cnt+1;
if s2<>' ' then
writeln (outfile1,cnt,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,
d2,d4,d5,d3,d6,d7,atmehr,atmemin,aday,ahr,amin,tat,' ',time1:4);
if s2=' ' then
begin
hfn:=hfn+1;
if time2<time1 then time2:=time2+1440;
writeln (outfile2,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,
d2,d4,d5,d3,d6,d7,atmehr,atmemin,aday,ahr,amin,tat,' ',time1:5,time2:5,hfn:4);
end;
end;
if (f5='+') and (f6='/') then
begin
cnt:=cnt+1;
time1:=(10*f13+f14)*60-10*f18-f19;
time2:=(10*f13+f14)*60+10*f18+f19+d13*60+d16;
if s2<>' ' then
writeln (outfile1,cnt,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,
d2,d4,d5,d3,d6,d7,atmehr,atmemin,aday,ahr,amin,tat,' ',time1:4,time2:4);
if s2=' ' then
begin
hfn:=hfn+1;
if time2<time1 then time2:=time2+1440;
writeln (outfile2,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,
d2,d4,d5,d3,d6,d7,atmehr,atmemin,aday,ahr,amin,tat,' ',time1:5,time2:5,hfn:4);
end;
end;
if (f7='-') and (f6<>'/') then
begin
cnt:=cnt+1;
time1:=(10*f13+f14)*60+10*f15+f16;
time2:=(10*f18+f19)*60+10*f110+f111+60*d13+d16;
if s2<>' ' then
writeln (outfile1,cnt,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,

```

```

d2,d4,d5,d3,d6,d7,atmehrr,atmemin,aday,ahr,amin,tat,' ',time1:4,time2:4);
if s2=' ' then
begin
hfn:=hfn+1;
if time2<time1 then time2:=time2+1440;
writeln (outfile2,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,
d2,d4,d5,d3,d6,d7,atmehrr,atmemin,aday,ahr,amin,tat,' ',time1:5,time2:5,hfn:4);
end;
end;
if (f7='+') and (f8='/') then
begin
cnt:=cnt+1;
time1:=(10*f13+f14)*60+10*f15+f16-10*f110-f111;
time2:=(10*f13+f14)*60+10*f15+f16+10*f110+f111+60*d13+d16;
if s2<>' ' then
writeln (outfile1,cnt,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,
d2,d4,d5,d3,d6,d7,atmehrr,atmemin,aday,ahr,amin,tat,' ',time1:4,time2:4);
if s2=' ' then
begin
hfn:=hfn+1;
if time2<time1 then time2:=time2+1440;
writeln (outfile2,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,
d2,d4,d5,d3,d6,d7,atmehrr,atmemin,aday,ahr,amin,tat,' ',time1:5,time2:5,hfn:4);
end;
end;
if (f5='+') and (f8='-') then
begin
cnt:=cnt+1;
time2:=(10*f13+f14)*60+10*f16+f17+60*d13+d16;
time1:=(10*f13+f14)*60-10*f19-f110;
if s2<>' ' then
writeln (outfile1,cnt,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,
d2,d4,d5,d3,d6,d7,atmehrr,atmemin,aday,ahr,amin,tat,' ',time1:4,time2:4);
if s2=' ' then
begin
hfn:=hfn+1;
if time2<time1 then time2:=time2+1440;
writeln (outfile2,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,
d2,d4,d5,d3,d6,d7,atmehrr,atmemin,aday,ahr,amin,tat,' ',time1:5,time2:5,hfn:4);
end;
end;
if (f7='+') and (f10='-') then
begin
cnt:=cnt+1;
time1:=(10*f13+f14)*60+10*f15+f16-10*f111-f112;
time2:=(10*f13+f14)*60+10*f15+f16+10*f18+f19+60*d13+d16;
if s2<>' ' then
writeln (outfile1,cnt,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,
d2,d4,d5,d3,d6,d7,atmehrr,atmemin,aday,ahr,amin,tat,' ',time1:4,time2:4);
if s2=' ' then
begin
hfn:=hfn+1;
if time2<time1 then time2:=time2+1440;

```

```

        end;
        end;
        end;
    for i:=-100 to 1440 do
    begin
        reset(outfile2);
        repeat
            readln(outfile2,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,d2,d4,d5,d3,d6,d7,
            atmehr,atmemin,aday,ahr,amin,tat,time1,time2,hfn);
            if i=time1 then writeln (outfile,id,ident,gts,sch,rev,s1,s2,s3,s4,d1,
            d2,d4,d5,d3,d6,d7,atmehr,atmemin,aday,ahr,amin,tat,time1:5,time2:5,hfn:4);
        until eof(outfile2);
    end;
    reset(outfile);
    repeat
        readln(outfile);
    until EOF (outfile);
    reset(outfile3);
    repeat
        readln(outfile3);
    until EOF (outfile3);
    end.

```

TOL.PAS Output (High Altitude Scheduling Tolerances).

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P9445HULA-A 00000.0 1012000000003510111150010035 -15 50 3
P2567REEF-A 00001.0 1012003000001510111655001114 0 45 6
P8275COOK-A 00000.0 1012002500000510120000010000 0 65 39
P6280BOSS-B 00000.0 1012000000000510120000010000 0 5 69
P7310COOK-B 00397.0 1012001500001010111415001110 5 35 5
P6391BOSS-B 00000.0 1012001000001010120000010000 10 20 97
P8639PIKE-A 00001.0 1012003000004510112309000513 30 75 14
P5953GUAM-B 00001.0 1012003500002010120000010000 30 110 34
P0470POGO-B 00001.0 1012010000001510112025000523 45 90 9
P5037LION-A 00000.0 1012004500071510120000010000 45 480 53
P4955INDI-A 00000.0 1012005400001010120000010000 54 64 62
P5037LION-A 00000.0 1012010000050010120000010000 60 360 54
P4035BOSS-B 00000.0 1012010000002510120000010000 60 85 67
P9521POGO-B 00001.0 1012012000001510112351000417 65 125 17
P7837GUAM-B 02004.0 1012011000003510120106001128 70 105 116
P6453COOK-A 00000.0 1012021500001510120000010000 90 165 22
P9442INDI-A 00000.0 1012020000001010120000010000 90 160 51
P5775REEF-A 00001.0 1012020000002010120000010000 90 170 90
P8639COOK-A 00001.0 1012014500001510112251000558 105 165 13
P9366PIKE-A 00000.0 1012015100001510120000010000 111 126 82
P7506POGO-B 05624.0 1012022500001510111700001020 145 180 7
P7310POGO-B 00398.0 1012025500002010120244001005 155 195 119
P0712BOSS-B 00000.0 1012031000001010120000010000 165 235 48
P4035LION-B 00000.0 1012024500000510120000010000 165 170 92
P3160GUAM-B 00001.0 1012025000002010120000010000 170 190 114
P6142HULA-B 00001.0 1012030000002510112204000901 180 235 11
P6392BOSS-B 00000.0 1012033000000510120000010000 180 245 37

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P6142HULA-B 00001.0 1012030000002510112204000901 180 235 11
 P6392BOSS-B 00000.0 1012033000000510120000010000 180 245 37
 P5329INDI-A 00001.0 101203250000201011115010050 205 270 2
 P7225GUAM-B 08403.0 1012033500001510111717001125 205 240 8
 P8896REEF-A 00001.0 1012034500004010120342001109 205 275 122
 P9441BOSS-B 00000.0 1012040000001510120000010000 210 285 84
 P6451HULA-B 00000.0 1012043000000510120000010000 225 290 89
 P4524BOSS-B 00000.0 1012043000001510120000010000 230 305 81
 P3726INDI-A 03010.9 1012035500004510120350001136 235 280 123
 P1920BOSS-A 00001.0 1012040000001510112313000729 240 285 15
 P5775GUAM-A 00001.0 1012042500002010120000010000 265 285 91
 P3726GUAM-B 03010.9 1012042500080010120420000828 265 745 125
 P2124BOSS-A 00001.0 1012043000002010120000010000 270 395 27
 P6280INDI-A 00000.0 1012050000001010120000010000 290 360 42
 P7506HULA-B 05625.0 1012050000001010120422001126 290 320 126
 P3028PIKE-A 00001.0 1012050000004510120321000642 300 345 121
 P4035BOSS-A 00000.0 1012053000001010120000010000 320 350 63
 P3160REEF-A 00001.0 1012053000002010120000010000 330 410 30
 P4845INDI-A 00000.0 1012054000000510120000010000 330 395 59
 P9445HULA-A 00000.0 101206100000251011150010035 345 400 4
 P7314BOSS-A 00000.0 1012062000000510120000010000 345 410 96
 P7225BOSS-B 08404.0 1012061000001010120534001042 350 380 129
 P6071PIKE-A 00000.0 1012055800005710120000010000 358 415 85
 P3055REEF-A 00001.0 1012062500001510112231001000 360 405 12
 P4373REEF-A 00001.0 1012060500001510120232001110 360 420 117
 P7304BOSS-B 06743.0 1012064500001510112113001009 395 420 10
 P7310BOSS-B 00398.0 1012072000001010120310000915 410 510 120
 P5775REEF-A 00001.0 1012070000001510120000010000 420 435 83
 P2272LION-B 00001.0 1012070000001510120637000334 420 465 132
 P6391INDI-A 00000.0 1012070500013010120000010000 425 515 44
 P2567PIKE-A 00001.0 1012075500004510120640000753 475 520 133
 P5775GUAM-A 00001.0 1012081000002010120000010000 490 510 86
 P7225BOSS-B 08404.0 1012083500001010120534001042 505 535 130
 P5953COOK-A 00001.0 1012090000002010120000010000 510 590 71
 P5329REEF-A 00001.0 101208350000201011115010050 515 535 1
 P6394COOK-A 00000.0 1012083500001010120000010000 515 525 72
 P0712LION-A 00000.0 1012091000000510120000010000 525 590 49
 P9364BOSS-A 00000.0 1012090000001010120000010000 525 580 93
 P6374INDI-A 00001.0 1012085000001510120043001104 530 545 115
 P4832REEF-A 00000.0 1012091000001010120000010000 540 610 77
 P6012HULA-A 03718.0 1012091500002510112325001119 545 580 16
 P4035BOSS-B 00000.0 1012092500001010120000010000 560 590 68
 P7304LION-B 06744.0 1012092000001510120838001055 560 575 138
 P2124LION-A 00001.0 1012093000002010120000010000 570 695 28
 P9446LION-B 00000.0 1012095000001510120000010000 570 645 78
 P8896POGO-B 00001.0 1012095000004010120732000407 575 645 134
 P9363HULA-B 00000.0 1012100000001010120000010000 590 620 66
 P6453HULA-B 00000.0 1012102500000510120000010000 590 655 88
 P9366LION-A 00000.0 1012103000000510120000010000 600 635 20
 P7304LION-A 06744.0 1012100500001010120838001055 605 615 137
 P5037LION-A 00000.0 1012110000001010120000010000 660 670 55
 P6451COOK-A 00000.0 1012112500001510120000010000 660 735 73
 P2524PIKE-A 00001.0 1012110000004510120528000716 660 705 128

P9783POGO-B 00001.0 1012113000001510121037000442 660 705 140
 P5775REEF-A 00001.0 1012113000002010120000010000 690 740 75
 P4524LION-B 00000.0 1012114500001010120000010000 690 760 99
 P7304INDI-A 06744.0 1012114000001010120822001133 690 720 136
 P6012LION-A 03719.0 1012113000003510121129001101 690 735 143
 P4845LION-B 00000.0 1012121100001010120000010000 701 771 79
 P9445GUAM-A 00000.0 1012120000002510120000010000 705 760 74
 P6071BOSS-B 00000.0 1012121500000510120000010000 725 790 40
 P7310POGO-B 00398.0 1012120500001010120244001005 725 755 118
 P3726INDI-A 03010.9 1012121000031510120357001129 730 925 124
 P9364LION-A 00000.0 1012121500003010120000010000 735 765 45
 P2124LION-B 00001.0 1012124000002010120000010000 750 830 94
 P7314COOK-B 00000.0 1012131000000510120000010000 760 825 87
 P6391LION-A 00000.0 1012130000000510120000010000 780 785 98
 P4955LION-B 00000.0 1012132000001010120000010000 800 810 61
 P4035LION-A 00000.0 1012134000001010120000010000 800 830 80
 P7837BOSS-A 02005.0 1012132000003510121314001104 800 835 147
 P9443GUAM-A 00000.0 1012135500001510120000010000 810 885 50
 P8275BOSS-A 00000.0 1012141500001510120000010000 825 900 24
 P5775GUAM-B 00001.0 1012135000002010120000010000 830 850 76
 P3310HULA-B 00001.0 1012140000001510121128000842 840 885 142
 P9366BOSS-A 00000.0 1012144500000510120000010000 855 920 47
 P5681PIKE-A 00001.0 1012141500004510121141000716 855 900 144
 P7506POGO-B 05625.0 1012142000001510120500001017 860 895 127
 P9444REEF-A 00000.0 1012144000003510120000010000 865 930 52
 P3160GUAM-B 00001.0 1012143000002010120000010000 870 950 31
 P5037LION-A 00000.0 1012143000001010120000010000 870 940 56
 P7310POGO-B 00399.0 1012145000002010121439001013 870 910 152
 P6280BOSS-A 00000.0 1012153000000510120000010000 900 965 18
 P3028BOSS-B 00001.0 1012150000001510121348000421 900 945 148
 P3726GUAM-B 03011.2 1012151000004510121502000058 910 955 155
 P3310PIKE-A 00001.0 1012151500004510121358000540 915 960 149
 P7225BOSS-B 08404.0 1012154000001510120534001042 920 955 131
 P5329INDI-A 00001.0 1012154000002010120000010000 935 990 70
 P6392INDI-A 00000.0 1012161500001010120000010000 965 1035 38
 P5681LION-B 00001.0 1012161500001510121433000532 975 1020 151
 P9446REEF-A 00000.0 1012170000000510120000010000 990 1055 23
 P5775GUAM-A 00001.0 1012163000002010120000010000 990 1070 25
 P5953COOK-B 00001.0 1012164500002010120000010000 990 1070 35
 P3726BOSS-A 03012.0 1012164000110010121600010000 1000 1660 156
 P6453GUAM-B 00000.0 1012171500000510120000010000 1005 1070 105
 P4373PIKE-A 00001.0 1012164500004510121617000739 1005 1050 159
 P7506POGO-B 05626.0 1012171000001010121656001020 1010 1040 160
 P2124BOSS-B 00001.0 1012170000002010120000010000 1020 1100 29
 P6738COOK-B 00001.0 1012172000001510121359000546 1020 1080 150
 P6394COOK-B 00000.0 1012175000000510120000010000 1035 1100 43
 P4035INDI-A 00000.0 1012173500001010120000010000 1040 1070 100
 P4845LION-A 00000.0 1012180000000510120000010000 1050 1115 60
 P7225GUAM-A 08405.0 1012180000001010121713001124 1070 1100 162
 P5329INDI-A 00001.0 1012180000002010120000010000 1080 1100 36
 P9364COOK-B 00000.0 1012181500001510120000010000 1080 1155 46
 P7641PIKE-A 00001.0 1012180000002010120000010000 1080 1160 104
 P2524POGO-B 00001.0 1012180000001510121743000428 1080 1140 154

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P5037LION-A 00000.0 1012193000001010120000010000 1110 1180 57
P9443HULA-A 00000.0 1012183000001010120000010000 1110 1120 95
P9434COOK-B 00000.0 1012184500001510120000010000 1110 1185 102
P7304POGO-B 06744.0 1012184500001510120912000958 1115 1140 139
P4524BOSS-B 00000.0 1012192500000510120000010000 1125 1190 109
P6391INDI-A 00000.0 1012191000001010120000010000 1130 1200 110
P7310BOSS-B 00399.0 10121945000010101214400G1015 1130 1230 153
P2941GUAM-B 00001.0 1012190000001510121455000912 1140 1185 154
P6451COOK-B 00000.0 1012194500000510120000010000 1155 1220 112
P7506POGO-B 05626.0 1012193500001010121656001020 1165 1195 161
P7304INDI-A 06744.0 1012194500000710120822001133 1185 1192 135
P7314COOK-B 00000.0 1012202000001510120000010000 1190 1265 19
P0470PIKE-A 00001.0 1012200000004510121901000747 1200 1245 165
P4832INDI-A 00000.0 1012201000001010120000010000 1210 1220 107
P9366LION-A 00000.0 1012203000000510120000010000 1215 1280 21
P9444REEF-A 00000.0 1012210000002510120000010000 1245 1300 108
P3160REEF-A 00001.0 1012214000002010120000010000 1260 1340 32
P7304GUAM-A 06745.0 1012210000002510122032001042 1260 1285 167
P6012POGO-B 03719.0 1012211500002510121149001014 1265 1300 146
P4035LION-A 00000.0 1012213000001010120000010000 1280 1310 64
P0712LION-A 00000.0 1012220000001510120000010000 1290 1365 103
P8896HULA-B 00001.0 1012213000004010121601000636 1290 1360 158
P9794POGO-A 00001.0 1012213000001510121949000435 1290 1350 166
P3726PIKE-A 03012.0 10122200000024510121600010000 1320 1485 157
P7304GUAM-A 06745.0 1012220000001010122032001042 1320 1330 168
P6071HULA-B 00000.0 1012223500001010120000010000 1325 1395 41
P3160GUAM-A 00001.0 1012223000002010120000010000 1350 1430 33
P5329LION-A 00001.0 1012223500003510120000010000 1355 1390 113
P6012INDI-A 03719.0 1012223500001310121144001105 1355 1368 145
P8275COOK-B 00000.0 1012231500000510120000010000 1365 1430 111
P2124BOSS-B 00001.0 1012231500002010120000010000 1380 1460 101
P5329REEF-A 00001.0 1012231000005510121118010044 1390 1445 141
P4845INDI-A 00000.0 1012234500001010120000010000 1395 1465 65
P5775GUAM-A 00001.0 1012233000002010120000010000 1410 1460 26
P5037LION-A 00000.0 1012233500002010120000010000 1415 1435 58
P6012HULA-B 03720.0 1012234500003510122321001119 1415 1470 169

```

CROSSRV.PAS. Cross check request and visibility. This PASCAL program is used for the medium and high altitude support requests only. This program cross references the visibility file created in **HREQ.PAS** and the above output from **TOL.PAS** to determine all the RTSs that can satisfy each medium or high altitude support request from **TOL.PAS**. If visibility at a RTS side will support only a portion of the tolerance window, the tolerance window reflects the smaller scheduling window.

```

program CROSSRV;
Type

```

```

mat = array[1..40, 1..3] of Integer;
Var
  I,j,N,cnt,bv,ev,ailen,req,snumlf,snumhf,irevlf,irevhf,aiday : Integer;
  snumdd,times,durlen,schr,scmin,sctot,sitme,d1n : integer;
  bthn,btmn,etmn,ethn,adn,ahn,aminn,addn,adh,adminn,time,time1,etime,
  etime1,dh1n,dmin1n,dur,vis,tol,hfnn : integer;
  error,aihr,sihr,aitmehr,aitmemin,irev,aimin,diff,silen,stm : integer;
  ident,lfident,hfident,smon,stme,amon,atme,alen,chk,ident1,amon1,
  atme1,hfn : string[4];
  slen,gts,gts1,slen1 : string[6];
  rev,rev1 : string[7];
  id,id1,sch,line,sp,s1,s2,s3,s4,s11,s21,s31,s41,sch1,h1,h1 : STRING[1];
  scnt,sbv,sev,sailen,nsctot,bth,bth2,eth,eth2 : string[4];
  aday,tat,ahr,atmehr,atmemin,d2,aday1,tat1,ahr1 : string[2];
  atmehr1,atmemin1,d11,d21,m1,d1,h1,min1,dd1,dh1,dmin1,m,d,h,min,dd,dh,dmin,
  am,ad,ah,amin,add,adh,admin,am1,ad1,ah1,amin1,add1,adh1,admin1 : string[2];
  last : string[3];
  fill : string[30];
  fill1 : string[16];
  revv,revlf,revhf : real;
  dum:STRING[9];
  Infile,Infile1,OutFile1,outfile2,outfile3,outfile4 : Text;
  stats : mat;
  Match :boolean;
Begin {Main Program}
  sp:=' ';
  chk:=' ';
  cnt:=0;
  snumlf:=1;
  snumhf:=300;
  irevlf:=0;
  irevhf:=9999;
  lfident:=' ';
  hfident:=' ';
  Writeln('Begin Reading Fin.dft');
  Assign(Infile1,'c:\raw18.dat');
  Reset(Infile1);
  Assign(infile,'c:\d18v.dat');
  Reset(infile);
  Assign(Outfile1,'C:\rv18.dat');
  Rewrite(Outfile1);
  Writeln('Reading Data');
  while not eof(infile1) do
    begin
      Readln (Infile1,id1,ident1,gts1,sch1,rev1,h11,m1,d1,h1,min1,dd1,dh1,dmin1,
        am1,ad1,ah1,amin1,add1,adh1,admin1,s1,bthn,ethn,hfnn);
      cnt:=cnt+1;
      Reset(infile);
    while not eof(infile) do
      begin
        read (infile,id,ident,gts,sch,rev,h1,m,d,h,min,dd,dh,dmin,
          am,ad,ah,amin,add,adh,admin,tat,fill);
        if bthn<0 then bthn:=0;

```

```

        if (ident=ident1) then
        begin
            str(bthn,bth);
            str(ethn,eth);
            str(hfn,hfn);
            val(bth,bthn,error);
            val(eth,ethn,error);
            val(ad,adn,error);
            val(ah,ahn,error);
            val(amin,aminn,error);
            val(add,addn,error);
            val(adh,adhnn,error);
            val(admin,adminn,error);
            val(d1,d1n,error);
            val(dmin1,dmin1n,error);
            val(dh1,dh1n,error);
            time1:=bthn+d1n*1440;
            time:=adn*1440+ahn*60+aminn;
            etime1:=ethn+time1-bthn;
            etime:=time+addn*1440+adhnn*60+adminn;
            dur:=dh1n*60+dmin1n;
            vis:=etime - time;
            tol:=ethn-bthn;
            if tol<0 then tol:=tol+1440;
            if (eth=' ') then ethn:=bthn+dur;
            if (time<=time1)and((time+dur)<=etime)then
            begin
                val(hfn,hfn,error);
                val(eth,ethn,error);
                val(bth,bthn,error);
            if dur<=(ethn-bthn) then writeln (outfile1,ident,gts,' ',bthn:4,' ',ethn:4,' ',cnt:4,dur:4);
                end;
            if (((time1<etime) or (time<etime1))and(vis>=dur)and(eth<>' '))then
            begin
                if (time<time1)and(etime1<etime) then
                begin
                    val(hfn,hfn,error);
                    val(eth,ethn,error);
                    val(bth,bthn,error);
                if dur<=(ethn-bthn) then writeln (outfile1,ident,gts,' ',bthn:4,' ',ethn:4,' ',cnt:4,dur:4);
                end;
                if (time>time1)and(etime1>etime) then
                begin
                    ahn:=ahn*60+aminn;
                    ethn:=ahn+adhnn*60+adminn;
                    val(hfn,hfn,error);
                if dur<=(ethn-ahn) then writeln (outfile1,ident,gts,' ',ahn:4,' ',ethn:4,' ',cnt:4,dur:4);
                end;
                if (time>time1)and(etime1<etime)and(etime1>time) then
                begin
                    ahn:=ahn*60+aminn;
                    val(eth,ethn,error);
                    val(hfn,hfn,error);

```

```

if dur<=(ethn-ahn) then writeln (outfile1,ident,gts,',ahn:4,',ethn:4,',cnt:4,dur:4);
end;
if(time<time1)and(etime1>etime)and(etime>time1) then
begin
ethn:=bthn+etime-time1;
if (ethn-bthn)>dur then
begin
ethn:=ethn-dur;
val(bth,bthn,error);
val(hfn,hfnn,error);
if dur<=(ethn-bthn) then writeln (outfile1,ident,gts,',bthn:4,',ethn:4,',cnt:4,dur:4);
end;
end;
end;
end;
end;
end;
end;
reset(outfile1);
repeat
readln(outfile1);
until EOF (outfile1);
end.
.
```

CROSSRV.PAS Output (Requests and Visibility Combinations).

9445HULA-A 0 50 1 35	7310SUN3-A 5 35 5 10	8639COOK-A 30 75 7 45
9445HULA-A 0 50 1 35	7310SUN3-A 5 35 5 10	8639PIKE-A 30 75 7 45
9445HULA-A 0 50 1 35	7310HAWK-A 5 35 5 10	8639PIKE-A 30 75 7 45
9445HULA-A 0 50 1 35	7310HAWK-A 5 35 5 10	8639PIKE-A 30 75 7 45
9445REEF-A 0 50 1 35	7310COOK-B 5 35 5 10	8639PIKE-A 30 75 7 45
9445GUAM-A 0 50 1 35	7310COOK-B 5 35 5 10	8639LION-A 30 75 7 45
9445HULA-B 0 50 1 35	7310PIKE-A 5 35 5 10	5953GUAM-B 30 110 8 20
2567INDI-A 0 45 2 15	7310PIKE-A 5 35 5 10	5953GUAM-B 30 110 8 20
2567INDI-A 0 45 2 15	7310POGO-B 5 35 5 10	5953HULA-B 30 110 8 20
2567REEF-A 0 45 2 15	7310POGO-B 5 35 5 10	5953HULA-B 30 110 8 20
2567REEF-A 0 45 2 15	7310BOSS-A 5 35 5 10	5953COOK-B 30 110 8 20
2567REEF-A 0 45 2 15	7310BOSS-A 5 35 5 10	5953COOK-B 30 110 8 20
2567REEF-A 0 45 2 15	6391INDI-A 10 20 6 10	5953PIKE-A 30 110 8 20
2567LION-A 0 45 2 15	6391INDI-A 10 20 6 10	5953PIKE-A 30 110 8 20
8275COOK-B 0 65 3 5	6391BOSS-A 10 20 6 10	0470COOK-B 45 90 9 15
8275PIKE-A 0 65 3 5	6391BOSS-A 10 20 6 10	0470COOK-B 45 90 9 15
8275BOSS-A 0 65 3 5	6391LION-A 10 20 6 10	0470PIKE-A 45 90 9 15
8275LION-A 0 65 3 5	6391LION-A 10 20 6 10	0470PIKE-A 45 90 9 15
6280INDI-A 0 5 4 5	8639GUAM-B 30 75 7 45	0470BOSS-A 45 90 9 15
6280BOSS-A 0 5 4 5	8639GUAM-B 30 75 7 45	0470BOSS-A 45 90 9 15
6280LION-A 0 5 4 5	8639HULA-B 30 75 7 45	0470POGO-B 45 90 9 15
6280BOSS-A 0 5 4 5	8639HULA-B 30 75 7 45	0470POGO-B 45 90 9 15
6280BOSS-B 0 5 4 5	8639POGO-B 30 75 7 45	0470POGO-B 45 90 9 15
7310HULA-B 5 35 5 10	8639POGO-B 30 75 7 45	0470POGO-B 45 90 9 15
7310HULA-B 5 35 5 10	8639COOK-B 30 75 7 45	0470LION-A 45 90 9 15
7310COOK-B 5 35 5 10	8639COOK-B 30 75 7 45	0470LION-A 45 90 9 15
7310COOK-B 5 35 5 10	8639COOK-A 30 75 7 45	5037BOSS-A 45 480 10 435

5037BOSS-A	45	480	10	435	9442COOK-B	90	160	17	10	7506BOSS-C	145	180	21	15
5037LION-A	45	480	10	435	9442COOK-B	90	160	17	10	7506BOSS-C	145	180	21	15
5037LION-A	45	480	10	435	9442PIKE-A	90	160	17	10	7506PIKE-A	145	180	21	15
5037LION-A	45	480	10	435	9442PIKE-A	90	160	17	10	7506HAWK-A	145	180	21	15
5037LION-A	45	480	10	435	9442BOSS-A	90	160	17	10	7506SUN3-A	145	180	21	15
4955INDI-A	54	64	11	10	9442BOSS-A	90	160	17	10	7506COOK-B	145	180	21	15
4955INDI-A	54	64	11	10	9442LION-A	90	160	17	10	7310HULA-B	155	195	22	20
4955BOSS-A	54	64	11	10	9442LION-A	90	160	17	10	7310COOK-B	155	195	22	20
4955BOSS-A	54	64	11	10	9442POGO-B	90	160	17	10	7310SUN3-A	155	195	22	20
4955LION-A	54	64	11	10	9442POGO-B	90	160	17	10	7310HAWK-A	155	195	22	20
4955LION-A	54	64	11	10	5775INDI-A	90	170	18	20	7310COOK-B	155	195	22	20
4955INDI-A	54	64	11	10	5775INDI-A	90	170	18	20	7310PIKE-A	155	195	22	20
4955INDI-A	54	64	11	10	5775REEF-A	90	170	18	20	7310POGO-B	155	195	22	20
5037BOSS-A	60	360	12	300	5775REEF-A	90	170	18	20	7310BOSS-A	155	195	22	20
5037BOSS-A	60	360	12	300	5775GUAM-B	90	170	18	20	7310INDI-A	155	195	22	20
5037LION-A	60	360	12	300	5775GUAM-B	90	170	18	20	7310INDI-A	155	195	22	20
5037LION-A	60	360	12	300	5775LION-A	90	170	18	20	7310REEF-A	155	195	22	20
5037LION-A	60	360	12	300	5775LION-A	90	170	18	20	7310REEF-A	155	195	22	20
5037LION-A	60	360	12	300	5775INDI-A	90	170	18	20	7310LION-A	155	195	22	20
4035BOSS-A	60	85	13	25	5775INDI-A	90	170	18	20	7310LION-A	155	195	22	20
4035BOSS-A	60	85	13	25	5775GUAM-A	90	170	18	20	7310POGO-B	164	195	22	20
4035LION-A	60	85	13	25	5775GUAM-A	90	170	18	20	7310POGO-B	164	195	22	20
4035LION-A	60	85	13	25	8639GUAM-B	105	165	19	15	0712PIKE-A	165	235	23	10
4035LION-A	60	85	13	25	8639GUAM-B	105	165	19	15	0712PIKE-A	165	235	23	10
4035LION-A	60	85	13	25	8639HULA-B	105	165	19	15	0712BOSS-A	165	235	23	10
9521INDI-A	65	125	14	15	8639HULA-B	105	165	19	15	0712BOSS-A	165	235	23	10
9521INDI-A	65	125	14	15	8639POGO-B	105	165	19	15	0712LION-A	165	235	23	10
9521REEF-A	65	125	14	15	8639POGO-B	105	143	19	15	0712LION-A	165	235	23	10
9521REEF-A	65	125	14	15	8639COOK-B	105	143	19	15	4035BOSS-A	165	170	24	5
9521LION-A	65	125	14	15	8639COOK-B	105	143	19	15	4035BOSS-A	165	170	24	5
9521LION-A	65	125	14	15	8639COOK-A	105	143	19	15	4035LION-A	165	170	24	5
9521POGO-B	65	125	14	15	8639COOK-A	105	143	19	15	4035LION-A	165	170	24	5
9521POGO-B	65	125	14	15	8639PIKE-A	105	143	19	15	4035LION-A	165	170	24	5
9521POGO-B	65	125	14	15	8639PIKE-A	105	143	19	15	4035LION-A	165	170	24	5
9521POGO-B	65	125	14	15	8639PIKE-A	105	143	19	15	3160INDI-A	170	190	25	20
9521GUAM-B	65	125	14	15	8639PIKE-A	105	143	19	15	3160INDI-A	170	190	25	20
9521GUAM-B	65	125	14	15	8639LION-A	105	143	19	15	3160REEF-A	170	190	25	20
9521BOSS-A	72	125	14	15	8639BOSS-A	105	143	19	15	3160REEF-A	170	190	25	20
7837LION-A	70	105	15	35	8639BOSS-A	105	143	19	15	3160GUAM-B	170	190	25	20
7837PIKE-A	70	105	15	35	9366PIKE-A	111	126	20	15	3160GUAM-B	170	190	25	20
7837POGO-B	70	105	15	35	9366PIKE-A	111	126	20	15	6142GUAM-B	180	235	26	25
7837GUAM-A	70	105	15	35	9366BOSS-A	111	126	20	15	6392INDI-A	180	245	27	5
7837GUAM-A	70	105	15	35	9366BOSS-A	111	126	20	15	6392INDI-A	180	245	27	5
7837GUAM-B	70	105	15	35	9366LION-A	111	126	20	15	6392PIKE-A	180	245	27	5
7837GUAM-B	70	105	15	35	9366LION-A	111	126	20	15	6392PIKE-A	180	245	27	5
6453GUAM-A	90	165	16	15	7506INDI-A	145	180	21	15	6392BOSS-A	180	245	27	5
6453GUAM-A	90	165	16	15	7506INDI-A	145	180	21	15	6392BOSS-A	180	245	27	5
6453HULA-B	90	165	16	15	7506LION-A	145	180	21	15	6392LION-A	180	245	27	5
6453HULA-B	90	165	16	15	7506LION-A	145	180	21	15	6392LION-A	180	245	27	5
6453COOK-B	90	165	16	15	7506POGO-B	145	180	21	15	6392POGO-B	180	245	27	5
6453COOK-B	90	165	16	15	7506POGO-B	145	180	21	15	6392POGO-B	180	245	27	5
9442INDI-A	90	160	17	10	7506BOSS-A	145	180	21	15	6392INDI-A	180	245	27	5
9442INDI-A	90	160	17	10	7506BOSS-A	145	180	21	15	6392INDI-A	180	245	27	5

5329REEF-A 205 270 28 20	4524BOSS-A 230 305 33 15	6280LION-A 290 360 39 10
5329REEF-A 205 270 28 20	4524BOSS-A 230 305 33 15	6280BOSS-A 290 360 39 10
5329REEF-A 205 270 28 20	4524LION-A 230 305 33 15	6280BOSS-A 290 360 39 10
5329REEF-A 205 270 28 20	4524LION-A 230 305 33 15	6280BOSS-B 290 360 39 10
5329INDI-A 205 270 28 20	3726BOSS-A 235 280 34 45	6280BOSS-B 290 360 39 10
5329INDI-A 205 270 28 20	1920COOK-B 240 285 35 15	7506INDI-A 290 320 40 10
5329REEF-A 205 270 28 20	1920COOK-B 240 269 35 15	7506LION-A 290 320 40 10
5329REEF-A 205 270 28 20	1920PIKE-A 240 269 35 15	7506POGO-B 290 320 40 10
5329LION-A 205 270 28 20	1920PIKE-A 240 269 35 15	7506BOSS-A 290 320 40 10
5329LION-A 205 270 28 20	1920BOSS-A 240 269 35 15	7506BOSS-C 290 320 40 10
7225GUAM-A 205 240 29 15	1920BOSS-A 240 269 35 15	7506PIKE-A 290 320 40 10
7225GUAM-A 205 240 29 15	1920POGO-B 240 269 35 15	7506HAWK-A 290 320 40 10
7225GUAM-B 205 240 29 15	1920POGO-B 240 269 35 15	7506SUN3-A 290 320 40 10
7225GUAM-B 205 240 29 15	1920LION-A 240 269 35 15	7506COOK-B 290 320 40 10
7225HULA-B 205 240 29 15	1920LION-A 240 269 35 15	7506HULA-B 290 320 40 10
7225HULA-B 205 240 29 15	5775INDI-A 265 285 36 20	7506HULA-B 290 320 40 10
7225SUN3-A 205 240 29 15	5775INDI-A 265 285 36 20	7506HULA-B 290 320 40 10
7225SUN3-A 205 240 29 15	5775REEF-A 265 285 36 20	7506HULA-B 290 320 40 10
7225HAWK-A 205 240 29 15	5775REEF-A 265 285 36 20	7506GUAM-A 290 320 40 10
7225HAWK-A 205 240 29 15	5775GUAM-B 265 285 36 20	7506GUAM-A 290 320 40 10
7225COOK-B 205 240 29 15	5775GUAM-B 265 285 36 20	7506COOK-B 290 320 40 10
7225COOK-B 205 240 29 15	5775LION-A 265 285 36 20	7506COOK-B 290 320 40 10
7225COOK-A 205 240 29 15	5775LION-A 265 285 36 20	7506SUN3-A 290 320 40 10
7225COOK-A 205 240 29 15	5775INDI-A 265 285 36 20	7506SUN3-A 290 320 40 10
7225POGO-B 205 240 29 15	5775INDI-A 265 285 36 20	7506HAWK-A 290 320 40 10
8896PIKE-A 205 275 30 40	5775INDI-A 265 285 36 20	7506HAWK-A 290 320 40 10
8896BOSS-A 205 275 30 40	5775GUAM-A 265 285 36 20	7506SUN3-A 290 320 40 10
8896POGO-B 205 275 30 40	5775GUAM-A 265 285 36 20	7506SUN3-A 290 320 40 10
8896LION-A 205 275 30 40	3726BOSS-A 265 745 37 480	7506SUN3-A 290 320 40 10
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 4524BOSS-A 1125 1190 138 5
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 7506SUN3-A 1165 1195 143 10
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 7506POGO-B 1165 1195 143 10
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 7506BOSS-C 1165 1195 143 10
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 7304COOK-B 1185 1192 144 7
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 7304GUAM-A 1185 1192 144 7
 7304COOK-B 1185 1192 144 7
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 7304SUN3-A 1185 1192 144 7
 7304HAWK-A 1185 1192 144 7
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 7304PIKE-A 1185 1192 144 7
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 7304POGO-B 1185 1192 144 7
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 7304BOSS-A 1185 1192 144 7
 7304BOSS-B 1185 1192 144 7
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 7304INDI-A 1185 1192 144 7
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 7304INDI-A 1185 1192 144 7
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 7304LION-A 1185 1192 144 7
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 7304SUN3-A 1185 1192 144 7
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 0470POGO-B 1200 1245 146 45
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 0470REEF-A 1200 1245 146 45
 0470LION-A 1200 1245 146 45
 0470POGO-B 1200 1245 146 45
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 0470GUAM-B 1200 1245 146 45

0470GUAM-B 1200 1245 146 45
 0470HULA-B 1200 1245 146 45
 0470HULA-B 1200 1245 146 45
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 7304BOSS-A 1260 1285 151 25
 7304BOSS-B 1260 1285 151 25

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7304INDI-A 1260 1285 151 25	6012POGO-B 1265 1300 152 25	9794BOSS-A 1290 1350 156 15
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7304LION-A 1260 1285 151 25	6012PIKE-A 1265 1300 152 25	3726PIKE-A 1320 1485 157 165
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7304BOSS-A 1260 1285 151 25	4035BOSS-A 1280 1310 153 10	3726BOSS-A 1320 1485 157 165
7304BOSS-C 1260 1285 151 25	4035LION-A 1280 1310 153 10	3726BOSS-A 1320 1485 157 165
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7304HULA-B 1260 1285 151 25	0712LION-A 1290 1365 154 15	3726BOSS-A 1320 1485 157 165
7304GUAM-A 1260 1285 151 25	8896PIKE-A 1290 1360 155 40	3726BOSS-A 1320 1485 157 165
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7304GUAM-A 1260 1285 151 25	8896POGO-B 1290 1360 155 40	3726PIKE-A 1320 1485 157 165
7304GUAM-A 1260 1285 151 25	8896LION-A 1290 1360 155 40	3726INDI-A 1320 1485 157 165
7304SUN3-A 1260 1285 151 25	8896INDI-A 1290 1360 155 40	3726INDI-A 1320 1485 157 165
7304SUN3-A 1260 1285 151 25	8896REEF-A 1290 1360 155 40	3726BOSS-A 1320 1485 157 165
7304HAWK-A 1260 1285 151 25	8896REEF-A 1290 1360 155 40	3726BOSS-A 1320 1485 157 165
7304HAWK-A 1260 1285 151 25	8896LION-A 1290 1360 155 40	3726PIKE-A 1320 1485 157 165
7304SUN3-A 1260 1285 151 25	8896POGO-B 1290 1360 155 40	3726PIKE-A 1320 1485 157 165
7304SUN3-A 1260 1285 151 25	8896POGO-B 1290 1360 155 40	3726PIKE-A 1320 1485 157 165
7304PIKE-A 1260 1285 151 25	8896GUAM-B 1290 1360 155 40	3726BOSS-A 1320 1485 157 165
7304PIKE-A 1260 1285 151 25	8896HULA-B 1290 1360 155 40	3726BOSS-A 1320 1485 157 165
6012GUAM-A 1265 1300 152 25	9794GUAM-B 1290 1350 156 15	3726COOK-B 1320 1485 157 165
6012HULA-B 1265 1300 152 25	9794HULA-B 1290 1350 156 15	3726COOK-B 1320 1485 157 165
6012HULA-A 1265 1300 152 25	9794POGO-B 1290 1350 156 15	3726HULA-B 1320 1485 157 165
6012SUN3-A 1265 1300 152 25	9794COOK-B 1290 1350 156 15	3726HULA-B 1320 1485 157 165
6012HAWK-A 1265 1300 152 25	9794PIKE-A 1290 1350 156 15	7304HULA-B 1320 1330 158 10
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6012COOK-B 1265 1300 152 25	9794POGO-B 1290 1350 156 15	7304GUAM-A 1320 1330 158 10
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6012LION-A 1265 1300 152 25	9794POGO-B 1290 1350 156 15	7304PIKE-A 1320 1330 158 10
6012LION-A 1265 1300 152 25	9794POGO-A 1290 1350 156 15	7304PIKE-A 1320 1330 158 10
6012LION-A 1265 1300 152 25	9794POGO-A 1290 1350 156 15	7304POGO-B 1320 1330 158 10
6012LION-A 1265 1300 152 25	9794LION-A 1290 1350 156 15	7304POGO-B 1320 1330 158 10
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6012BOSS-A 1265 1300 152 25	9794COOK-B 1290 1350 156 15	7304BOSS-A 1320 1330 158 10
6012BOSS-A 1265 1300 152 25	9794COOK-B 1290 1350 156 15	7304BOSS-B 1320 1330 158 10
6012INDI-A 1265 1300 152 25	9794PIKE-A 1290 1350 156 15	

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 5329REEF-A 1390 1445 165 55
 5329INDI-A 1390 1445 165 55

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 4845REEF-A 1395 1430 166 10
 4845REEF-A 1395 1430 166 10
 4845LION-A 1395 1430 166 10
 4845LION-A 1395 1430 166 10
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 6012HAWK-A 1421 1470 169 35
 6012COOK-B 1422 1470 169 35
 6012COOK-B 1422 1470 169 35
 6012PIKE-A 1435 1470 169 35

RTS.PAS. This PASCAL program is used for the medium and high altitude support requests only. This program ensures all RTS sides are included once and only once for each support request-RTS visibility combination.

```

program rts;
Type
  mat = array[1..40, 1..3] of Integer;
Var
  I,j,N,cnt,bv,ev,ailen,req,snumlf,snumhf,irevlf,irevhf,aday : Integer;
  snumdd,times,durlen,schr,scmin,sctot,sime,d1n : integer;
  bt,et,du,et1,bt1,du1,bth1n,eth1n,hfn1n,dur1n : integer;
  bthn,btmn,etmn,ethn,adn,ahn,aminn,addn,adh1n,adminn,time,time1,etime,
  etime1,dh1n,dmin1n,vis,tol,durn,e,e1,hfnn : integer;
  error,aihr,sihr,aitmeh1r,aitmemin,irev,aimin,diff,silen,stm : integer;
  ident,lfidnt,hfidnt,smon,stme,amon,atme,alen,chk,ident1,amon1,
  atme1,dur,bth1,eth1,hfn1,dur1 : string[4];
  slen,gts,gts1,slen1 : string[6];
  gts2,bth,eth,hfn,phfn : string[5];
  rev,rev1 : string[7];
  id,id1,sch,line,sp,s1,s2,s3,s4,s11,s21,s31,s41,sch1,h11,h1 : STRING[1];
  scnt,sbv,sev,sailen,nsctot,bth2,eth2 : string[4];
  aday,tat,ahr,atmeh1r,atmemin,d2,aday1,tat1,ahr1 : string[2];
  atmeh1r,atmemin1,d11,d21,m1,d1,h1,min1,dd1,dh1,dmin1,m,d,b,min,dd,dh,dmin,
  am,ad,ah,amin,add,adh,admin,am1,ad1,ah1,amin1,add1,adh1,admin1 : string[2];
  last : string[3];
  fill : string[40];
  fill1 : string[19];
  revv,revlf,revhf : real;
  dum:STRING[9];
  Infile,Infile1,OutFile1,outfile2,outfile3,outfile4,outfile : Text;
  stats : mat;
  Match :boolean;
Begin {Main Program}
  phfn:=' 0';
  sp:=' ';
  chk:=' ';
  cnt:=1;
  snumlf:=1;
  snumhf:=300;
  irevlf:=0;
  irevhf:=9999;
  lfident:=' ';
  hfident:=' ';
  Writeln('Begin Reading Fin.dft');
  Assign(Infile1,'c:\rv.dat');
  Reset(Infile1);
  Assign(infile,'c:\d1v.dat');
  Reset(infile);

```

```

Assign(Outfile1,'C:\d12s.dat');
Rewrite(Outfile1);
assign(outfile,'c:\requp.dat');
rewrite(outfile);
Assign(Outfile4,'C:\d.dat');
Rewrite(Outfile4);
Writeln('Reading Data');
  repeat
  begin
    readln(infile1,ident,gts2,id,bth,eth,hfn,dur);
      if gts2='POGO-' then
      begin
        if hfn<>phfn then
        begin
          val(hfn,hfnn,error);
          writeln (outfile1,hfnn:4,' ',gts2,'A',bth,eth,' ',dur,' 15 ',ident,'00000.0');
          writeln (outfile1,hfnn:4,' ',gts2,'B',bth,eth,' ',dur,' 15 ',ident,'00000.0');
          writeln (outfile1,hfnn:4,' ',gts2,'C',bth,eth,' ',dur,' 15 ',ident,'00000.0');
          cnt:=cnt+1;
          phfn:=hfn;
          end;
          end;
          end;
          until eof(infile1);
          reset(infile1);
          phfn:= ' 0';
          repeat
            begin
              readln (infile1,ident,gts2,id,bth,eth,hfn,dur);
              if gts2='HULA-' then
              begin
                if hfn<>phfn then
                begin
                  val(hfn,hfnn,error);
                  writeln (outfile1,hfnn:4,' ',gts2,'A',bth,eth,' ',dur,' 15 ',ident,'00000.0');
                  writeln (outfile1,hfnn:4,' ',gts2,'B',bth,eth,' ',dur,' 15 ',ident,'00000.0');
                  cnt:=cnt+1;
                  phfn:=hfn;
                  end;
                  end;
                  end;
                  until eof(infile1);
                  reset(infile1);
                  phfn:= ' 0';
                  repeat
                    begin
                      readln (infile1,ident,gts2,id,bth,eth,hfn,dur);
                      if gts2='COOK-' then
                      begin
                        if hfn<>phfn then
                        begin
                          val(hfn,hfnn,error);
                          writeln (outfile1,hfnn:4,' ',gts2,'A',bth,eth,' ',dur,' 15 ',ident,'00000.0');

```

```

        writeln (outfile1,hfnn:4,' ',gts2,'B',bth,eth,' ',dur,' 15 ',ident,'00000.0');
        cnt:=cnt+1;
    phfn:=hfn;
    end;
    end;
    end;
    until eof(infile1);
        reset(infile1);
        phfn:=' 0';
        repeat
            begin
readln (infile1,ident,gts2,id,bth,eth,hfn,dur);
if gts2='TNDI-' then
begin
if hfn<>phfn then
begin
val(hfn,hfnn,error);
writeln (outfile1,hfnn:4,' ',gts2,'A',bth,eth,' ',dur,' 15 ',ident,'00000.0');
        cnt:=cnt+1;
        phfn:=hfn;
        end;
        end;
        end;
        until eof(infile1);
            reset(infile1);
            phfn:=' 0';
            repeat
                begin
readln (infile1,ident,gts2,id,bth,eth,hfn,dur);
if gts2='BOSS-' then
begin
if hfn<>phfn then
begin
val(hfn,hfnn,error);
writeln (outfile1,hfnn:4,' ',gts2,'A',bth,eth,' ',dur,' 15 ',ident,'00000.0');
                writeln (outfile1,hfnn:4,' ',gts2,'B',bth,eth,' ',dur,' 15 ',ident,'00000.0');
                cnt:=cnt+1;
                phfn:=hfn;
                end;
                end;
                end;
                until eof(infile1);
                    reset(infile1);
                    phfn:=' 0';
                    repeat
                        begin
readln (infile1,ident,gts2,id,bth,eth,hfn,dur);
if gts2='LION-' then
begin
if hfn<>phfn then
begin
val(hfn,hfnn,error);
writeln (outfile1,hfnn:4,' ',gts2,'A',bth,eth,' ',dur,' 15 ',ident,'00000.0');

```

```

        writeln (outfile1,hfnn:4,' ',gts2,'B',bth,eth,' ',dur,' 15 ',ident,'00000.0');
        cnt:=cnt+1;
    phfn:=hfn;
    end;
    end;
    end;
    until eof(infile1);
        reset(infile1);
        phfn:=' 0';
        repeat
            begin
readln (infile1,ident,gts2,id,bth,eth,hfn,dur);
if gts2='GUAM-' then
begin
if hfn<>phfn then
begin
val(hfn,hfnn,error);
writeln (outfile1,hfnn:4,' ',gts2,'A',bth,eth,' ',dur,' 15 ',ident,'00000.0');
        writeln (outfile1,hfnn:4,' ',gts2,'B',bth,eth,' ',dur,' 15 ',ident,'00000.0');
        cnt:=cnt+1;
        phfn:=hfn;
        end;
        end;
        end;
        until eof(infile1);
            reset(infile1);
            phfn:=' 0';
            repeat
                begin
readln (infile1,ident,gts2,id,bth,eth,hfn,dur);
if gts2='PIKE-' then
begin
if hfn<>phfn then
begin
val(hfn,hfnn,error);
writeln (outfile1,hfnn:4,' ',gts2,'A',bth,eth,' ',dur,' 15 ',ident,'00000.0');
        cnt:=cnt+1;
        phfn:=hfn;
        end;
        end;
        end;
        until eof(infile1);
            reset(infile1);
            phfn:=' 0';
            repeat
                begin
readln (infile1,ident,gts2,id,bth,eth,hfn,dur);
if gts2='REEF-' then
begin
if hfn<>phfn then
begin
val(hfn,hfnn,error);
writeln (outfile1,hfnn:4,' ',gts2,'A',bth,eth,' ',dur,' 15 ',ident,'00000.0');

```

```

        cnt:=cnt+1;
    phfn:=hfn;
    end;
    end;
    end;
    until eof(infile1);
        reset(outfile1);

    repeat
        readln(outfile1);
    until EOF(outfile1);
    for i:=1 to 300 do
        begin
            reset(outfile1);
            repeat
                readln(outfile1,hfn,fill);
                if hfn=i then writeln(outfile,hfn:4,fill);
            until eof(outfile1);
            end;
            reset(outfile);
            repeat
                readln(outfile);
            until eof(outfile);
        end.
    end.

```

RTS.PAS Output (High Altitude Support Requests).

1 HULA-A	0	50	35	15	944500000.0	5 COOK-B	5	35	10	15	731000000.0
1 HULA-B	0	50	35	15	944500000.0	5 BOSS-A	5	35	10	15	731000000.0
1 GUAM-A	0	50	35	15	944500000.0	5 BOSS-B	5	35	10	15	731000000.0
1 GUAM-B	0	50	35	15	944500000.0	5 PIKE-A	5	35	10	15	731000000.0
1 REEF-A	0	50	35	15	944500000.0	6 INDI-A	10	20	10	15	639100000.0
2 INDI-A	0	45	15	15	256700000.0	6 BOSS-A	10	20	10	15	639100000.0
2 LION-A	0	45	15	15	256700000.0	6 BOSS-B	10	20	10	15	639100000.0
2 LION-B	0	45	15	15	256700000.0	6 LION-A	10	20	10	15	639100000.0
2 REEF-A	0	45	15	15	256700000.0	6 LION-B	10	20	10	15	639100000.0
3 COOK-A	0	65	5	15	827500000.0	7 POGO-A	30	75	45	15	863900000.0
3 COOK-B	0	65	5	15	827500000.0	7 POGO-B	30	75	45	15	863900000.0
3 BOSS-A	0	65	5	15	827500000.0	7 POGO-C	30	75	45	15	863900000.0
3 BOSS-B	0	65	5	15	827500000.0	7 HULA-A	30	75	45	15	863900000.0
3 LION-A	0	65	5	15	827500000.0	7 HULA-B	30	75	45	15	863900000.0
3 LION-B	0	65	5	15	827500000.0	7 COOK-A	30	75	45	15	863900000.0
3 PIKE-A	0	65	5	15	827500000.0	7 COOK-B	30	75	45	15	863900000.0
4 INDI-A	0	5	5	15	628000000.0	7 LION-A	30	75	45	15	863900000.0
4 BOSS-A	0	5	5	15	628000000.0	7 LION-B	30	75	45	15	863900000.0
4 BOSS-B	0	5	5	15	628000000.0	7 GUAM-A	30	75	45	15	863900000.0
4 LION-A	0	5	5	15	628000000.0	7 GUAM-B	30	75	45	15	863900000.0
4 LION-B	0	5	5	15	628000000.0	7 PIKE-A	30	75	45	15	863900000.0
5 POGO-A	5	35	10	15	731000000.0	8 HULA-A	30	110	20	15	595300000.0
5 POGO-B	5	35	10	15	731000000.0	8 HULA-B	30	110	20	15	595300000.0
5 POGO-C	5	35	10	15	731000000.0	8 COOK-A	30	110	20	15	595300000.0
5 HULA-A	5	35	10	15	731000000.0	8 COOK-B	30	110	20	15	595300000.0
5 HULA-B	5	35	10	15	731000000.0	8 GUAM-A	30	110	20	15	595300000.0
5 COOK-A	5	35	10	15	731000000.0	8 GUAM-B	30	110	20	15	595300000.0

8 PIKE-A	30	110	20	15	595300000.0	17 POGO-A	90	160	10	15	944200000.0
9 POGO-A	45	90	15	15	047000000.0	17 POGO-B	90	160	10	15	944200000.0
9 POGO-B	45	90	15	15	047000000.0	17 POGO-C	90	160	10	15	944200000.0
9 POGO-C	45	90	15	15	047000000.0	17 COOK-A	90	160	10	15	944200000.0
9 COOK-A	45	90	15	15	047000000.0	17 COOK-B	90	160	10	15	944200000.0
9 COOK-B	45	90	15	15	047000000.0	17 INDI-A	90	160	10	15	944200000.0
9 BOSS-A	45	90	15	15	047000000.0	17 BOSS-A	90	160	10	15	944200000.0
9 BOSS-B	45	90	15	15	047000000.0	17 BOSS-B	90	160	10	15	944200000.0
9 LION-A	45	90	15	15	047000000.0	17 LION-A	90	160	10	15	944200000.0
9 LION-B	45	90	15	15	047000000.0	17 LION-B	90	160	10	15	944200000.0
9 PIKE-A	45	90	15	15	047000000.0	17 PIKE-A	90	160	10	15	944200000.0
10 BOSS-A	45	480	435	15	503700000.0	18 INDI-A	90	170	20	15	577500000.0
10 BOSS-B	45	480	435	15	503700000.0	18 LION-A	90	170	20	15	577500000.0
10 LION-A	45	480	435	15	503700000.0	18 LION-B	90	170	20	15	577500000.0
10 LION-B	45	480	435	15	503700000.0	18 GUAM-A	90	170	20	15	577500000.0
11 INDI-A	54	64	10	15	495500000.0	18 GUAM-B	90	170	20	15	577500000.0
11 BOSS-A	54	64	10	15	495500000.0	18 REEF-A	90	170	20	15	577500000.0
11 BOSS-B	54	64	10	15	495500000.0	19 POGO-A	105	165	15	15	863900000.0
11 LION-A	54	64	10	15	495500000.0	19 POGO-B	105	165	15	15	863900000.0
11 LION-B	54	64	10	15	495500000.0	19 POGO-C	105	165	15	15	863900000.0
12 BOSS-A	60	360	300	15	503700000.0	19 HULA-A	105	165	15	15	863900000.0
12 BOSS-B	60	360	300	15	503700000.0	19 HULA-B	105	165	15	15	863900000.0
12 LION-A	60	360	300	15	503700000.0	19 COOK-A	105	143	15	15	863900000.0
12 LION-B	60	360	300	15	503700000.0	19 COOK-B	105	143	15	15	863900000.0
13 BOSS-A	60	85	25	15	403500000.0	19 BOSS-A	105	143	15	15	863900000.0
13 BOSS-B	60	85	25	15	403500000.0	19 BOSS-B	105	143	15	15	863900000.0
13 LION-A	60	85	25	15	403500000.0	19 LION-A	105	143	15	15	863900000.0
13 LION-B	60	85	25	15	403500000.0	19 LION-B	105	143	15	15	863900000.0
14 POGO-A	65	125	15	15	952100000.0	19 GUAM-A	105	165	15	15	863900000.0
14 POGO-B	65	125	15	15	952100000.0	19 GUAM-B	105	165	15	15	863900000.0
14 POGO-C	65	125	15	15	952100000.0	19 PIKE-A	105	143	15	15	863900000.0
14 INDI-A	65	125	15	15	952100000.0	20 BOSS-A	111	126	15	15	936600000.0
14 BOSS-A	72	125	15	15	952100000.0	20 BOSS-B	111	126	15	15	936600000.0
14 BOSS-B	72	125	15	15	952100000.0	20 LION-A	111	126	15	15	936600000.0
14 LION-A	65	125	15	15	952100000.0	20 LION-B	111	126	15	15	936600000.0
14 LION-B	65	125	15	15	952100000.0	20 PIKE-A	111	126	15	15	936600000.0
14 GUAM-A	65	125	15	15	952100000.0	21 POGO-A	145	180	15	15	750600000.0
14 GUAM-B	65	125	15	15	952100000.0	21 POGO-B	145	180	15	15	750600000.0
14 REEF-A	65	125	15	15	952100000.0	21 POGO-C	145	180	15	15	750600000.0
15 POGO-A	70	105	35	15	783700000.0	21 COOK-A	145	180	15	15	750600000.0
15 POGO-B	70	105	35	15	783700000.0	21 COOK-B	145	180	15	15	750600000.0
15 POGO-C	70	105	35	15	783700000.0	21 INDI-A	145	180	15	15	750600000.0
15 LION-A	70	105	35	15	783700000.0	21 BOSS-A	145	180	15	15	750600000.0
15 LION-B	70	105	35	15	783700000.0	21 BOSS-B	145	180	15	15	750600000.0
15 GUAM-A	70	105	35	15	783700000.0	21 LION-A	145	180	15	15	750600000.0
15 GUAM-B	70	105	35	15	783700000.0	21 LION-B	145	180	15	15	750600000.0
15 PIKE-A	70	105	35	15	783700000.0	21 PIKE-A	145	180	15	15	750600000.0
16 HULA-A	90	165	15	15	645300000.0	22 POGO-A	155	195	20	15	731000000.0
16 HULA-B	90	165	15	15	645300000.0	22 POGO-B	155	195	20	15	731000000.0
16 COOK-A	90	165	15	15	645300000.0	22 POGO-C	155	195	20	15	731000000.0
16 COOK-B	90	165	15	15	645300000.0	22 HULA-A	155	195	20	15	731000000.0
16 GUAM-A	90	165	15	15	645300000.0	22 HULA-B	155	195	20	15	731000000.0
16 GUAM-B	90	165	15	15	645300000.0	22 COOK-A	155	195	20	15	731000000.0

22 COOK-B 155 195 20 15 731000000.0
 22 INDI-A 155 195 20 15 731000000.0
 22 BOSS-A 155 195 20 15 731000000.0
 22 BOSS-B 155 195 20 15 731000000.0
 22 LION-A 155 195 20 15 731000000.0
 22 LION-B 155 195 20 15 731000000.0
 22 PIKE-A 155 195 20 15 731000000.0
 22 REEF-A 155 195 20 15 731000000.0
 23 BOSS-A 165 235 10 15 071200000.0
 23 BOSS-B 165 235 10 15 071200000.0
 23 LION-A 165 235 10 15 071200000.0
 23 LION-B 165 235 10 15 071200000.0
 23 PIKE-A 165 235 10 15 071200000.0
 24 BOSS-A 165 170 5 15 403500000.0
 24 BOSS-B 165 170 5 15 403500000.0
 24 LION-A 165 170 5 15 403500000.0
 24 LION-B 165 170 5 15 403500000.0
 25 INDI-A 170 190 20 15 316000000.0
 25 GUAM-A 170 190 20 15 316000000.0
 25 GUAM-B 170 190 20 15 316000000.0
 25 REEF-A 170 190 20 15 316000000.0
 26 GUAM-A 180 235 25 15 614200000.0
 26 GUAM-B 180 235 25 15 614200000.0
 27 POGO-A 180 245 5 15 639200000.0
 27 POGO-B 180 245 5 15 639200000.0
 27 POGO-C 180 245 5 15 639200000.0
 27 INDI-A 180 245 5 15 639200000.0
 27 BOSS-A 180 245 5 15 639200000.0
 27 BOSS-B 180 245 5 15 639200000.0
 27 LION-A 180 245 5 15 639200000.0
 27 LION-B 180 245 5 15 639200000.0
 27 PIKE-A 180 245 5 15 639200000.0
 28 INDI-A 205 270 20 15 532900000.0
 28 LION-A 205 270 20 15 532900000.0
 28 LION-B 205 270 20 15 532900000.0
 28 REEF-A 205 270 20 15 532900000.0
 29 POGO-A 205 240 15 15 722500000.0
 29 POGO-B 205 240 15 15 722500000.0
 29 POGO-C 205 240 15 15 722500000.0
 29 HULA-A 205 240 15 15 722500000.0
 29 HULA-B 205 240 15 15 722500000.0
 29 COOK-A 205 240 15 15 722500000.0
 29 COOK-B 205 240 15 15 722500000.0
 29 GUAM-A 205 240 15 15 722500000.0
 29 GUAM-B 205 240 15 15 722500000.0
 30 POGO-A 205 275 40 15 889600000.0
 30 POGO-B 205 275 40 15 889600000.0
 30 POGO-C 205 275 40 15 889600000.0
 30 INDI-A 205 275 40 15 889600000.0
 30 BOSS-A 205 275 40 15 889600000.0
 30 BOSS-B 205 275 40 15 889600000.0
 30 LION-A 205 275 40 15 889600000.0
 30 LION-B 205 275 40 15 889600000.0

30 PIKE-A 205 275 40 15 889600000.0
 30 REEF-A 222 275 40 15 889600000.0
 31 HULA-A 210 285 15 15 944100000.0
 31 HULA-B 210 285 15 15 944100000.0
 31 COOK-A 210 285 15 15 944100000.0
 31 COOK-B 210 285 15 15 944100000.0
 31 BOSS-A 210 285 15 15 944100000.0
 31 BOSS-B 210 285 15 15 944100000.0
 31 PIKE-A 210 285 15 15 944100000.0
 32 HULA-A 225 290 5 15 645100000.0
 32 HULA-B 225 290 5 15 645100000.0
 32 COOK-A 225 290 5 15 645100000.0
 32 COOK-B 225 290 5 15 645100000.0
 32 BOSS-A 225 290 5 15 645100000.0
 32 BOSS-B 225 290 5 15 645100000.0
 32 PIKE-A 225 290 5 15 645100000.0
 33 INDI-A 230 305 15 15 452400000.0
 33 BOSS-A 230 305 15 15 452400000.0
 33 BOSS-B 230 305 15 15 452400000.0
 33 LION-A 230 305 15 15 452400000.0
 33 LION-B 230 305 15 15 452400000.0
 34 BOSS-A 235 280 45 15 372600000.0
 34 BOSS-B 235 280 45 15 372600000.0
 35 POGO-A 240 269 15 15 192000000.0
 35 POGO-B 240 269 15 15 192000000.0
 35 POGO-C 240 269 15 15 192000000.0
 35 COOK-A 240 285 15 15 192000000.0
 35 COOK-B 240 285 15 15 192000000.0
 35 BOSS-A 240 269 15 15 192000000.0
 35 BOSS-B 240 269 15 15 192000000.0
 35 LION-A 240 269 15 15 192000000.0
 35 LION-B 240 269 15 15 192000000.0
 35 PIKE-A 240 269 15 15 192000000.0
 36 INDI-A 265 285 20 15 577500000.0
 36 LION-A 265 285 20 15 577500000.0
 36 LION-B 265 285 20 15 577500000.0
 36 GUAM-A 265 285 20 15 577500000.0
 36 GUAM-B 265 285 20 15 577500000.0
 36 REEF-A 265 285 20 15 577500000.0
 37 COOK-A 265 745 480 15 372600000.0
 37 COOK-B 265 745 480 15 372600000.0
 37 INDI-A 265 745 480 15 372600000.0
 37 BOSS-A 265 745 480 15 372600000.0
 37 BOSS-B 265 745 480 15 372600000.0
 37 GUAM-A 265 745 480 15 372600000.0
 37 GUAM-B 265 745 480 15 372600000.0
 37 PIKE-A 265 745 480 15 372600000.0
 38 BOSS-A 270 395 20 15 212400000.0
 38 BOSS-B 270 395 20 15 212400000.0
 38 LION-A 270 395 20 15 212400000.0
 38 LION-B 270 395 20 15 212400000.0
 38 PIKE-A 270 395 20 15 212400000.0
 39 INDI-A 290 360 10 15 628000000.0

39 BOSS-A 290 360 10 15 628000000.0
 39 BOSS-B 290 360 10 15 628000000.0
 39 LION-A 290 360 10 15 628000000.0
 39 LION-B 290 360 10 15 628000000.0
 40 POGO-A 290 320 10 15 750600000.0
 40 POGO-B 290 320 10 15 750600000.0
 40 POGO-C 290 320 10 15 750600000.0
 40 HULA-A 290 320 10 15 750600000.0
 40 HULA-B 290 320 10 15 750600000.0
 40 COOK-A 290 320 10 15 750600000.0
 40 COOK-B 290 320 10 15 750600000.0
 40 INDI-A 290 320 10 15 750600000.0
 40 BOSS-A 290 320 10 15 750600000.0
 40 BOSS-B 290 320 10 15 750600000.0
 40 LION-A 290 320 10 15 750600000.0
 40 LION-B 290 320 10 15 750600000.0
 40 GUAM-A 290 320 10 15 750600000.0
 40 GUAM-B 290 320 10 15 750600000.0
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 102 POGO-B 860 895 15 15 750600000.0
 102 POGO-C 860 895 15 15 750600000.0
 102 HULA-A 860 895 15 15 750600000.0
 102 HULA-B 860 895 15 15 750600000.0
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 102 COOK-B 860 895 15 15 750600000.0
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 103 LION-A 865 930 35 15 944400000.0
 103 LION-B 865 930 35 15 944400000.0
 103 GUAM-A 865 930 35 15 944400000.0

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 103 REEF-A 865 930 35 15 944400000.0
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 113 POGO-C 965 1035 10 15 639200000.0
 113 INDI-A 965 1035 10 15 639200000.0
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114 REEF-A 975 1020 15 15 568100000.0
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 116 GUAM-A 990 1070 20 15 577500000.0
 116 GUAM-B 990 1070 20 15 577500000.0
 116 REEF-A 990 1070 20 15 577500000.0
 117 HULA-A 990 1070 20 15 595300000.0
 117 HULA-B 990 1070 20 15 595300000.0
 117 COOK-A 990 1070 20 15 595300000.0
 117 COOK-B 990 1070 20 15 595300000.0
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 118 BOSS-A 1000 1660 660 15 372600000.0
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 119 HULA-A 1005 1070 5 15 645300000.0
 119 HULA-B 1005 1070 5 15 645300000.0
 119 COOK-A 1005 1070 5 15 645300000.0
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 121 POGO-B 1010 1040 10 15 750600000.0
 121 POGO-C 1010 1040 10 15 750600000.0
 121 HULA-A 1010 1040 10 15 750600000.0
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 121 LION-B 1010 1040 10 15 750600000.0
 121 GUAM-A 1010 1040 10 15 750600000.0

121 GUAM-B 1010 1040 10 15 750600000.0
 121 PIKE-A 1010 1040 10 15 750600000.0
 121 REEF-A 1010 1040 10 15 750600000.0
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 122 BOSS-B 1020 1100 20 15 212400000.0
 122 LION-A 1020 1100 20 15 212400000.0
 122 LION-B 1020 1100 20 15 212400000.0
 122 PIKE-A 1020 1100 20 15 212400000.0
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 123 POGO-B 1020 1080 15 15 673800000.0
 123 POGO-C 1020 1080 15 15 673800000.0
 123 HULA-A 1020 1080 15 15 673800000.0
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 123 COOK-B 1020 1080 15 15 673800000.0
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 124 COOK-B 1035 1100 5 15 639400000.0
 124 GUAM-A 1035 1100 5 15 639400000.0
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 126 LION-B 1050 1115 5 15 484500000.0
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 127 HULA-A 1070 1100 10 15 722500000.0
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 127 COOK-B 1070 1100 10 15 722500000.0
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 127 LION-B 1070 1100 10 15 722500000.0
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 127 GUAM-B 1070 1100 10 15 722500000.0
 127 PIKE-A 1070 1100 10 15 722500000.0

128 INDI-A 1080 1100 20 15 532900000.0
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 129 COOK-B 1080 1155 15 15 936400000.0
 129 BOSS-A 1080 1155 15 15 936400000.0
 129 BOSS-B 1080 1155 15 15 936400000.0
 129 LION-A 1080 1155 15 15 936400000.0
 129 LION-B 1080 1155 15 15 936400000.0
 129 PIKE-A 1080 1155 15 15 936400000.0
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 130 BOSS-A 1080 1160 20 15 764100000.0
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 131 COOK-A 1080 1140 15 15 252400000.0
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 133 HULA-A 1105 1150 45 15 889600000.0
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 133 BOSS-A 1105 1150 45 15 889600000.0
 133 BOSS-B 1105 1150 45 15 889600000.0
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134 LION-B 1110 1180 10 15 503700000.0
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 137 POGO-B 1115 1140 15 15 730400000.0
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 137 HULA-A 1115 1140 15 15 730400000.0
 137 HULA-B 1115 1140 15 15 730400000.0
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 137 GUAM-B 1115 1140 15 15 730400000.0
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 144 POGO-C 1185 1192 7 15 730400000.0
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 144 COOK-A 1185 1192 7 15 730400000.0
 144 COOK-B 1185 1192 7 15 730400000.0
 144 INDI-A 1185 1192 7 15 730400000.0

144 BOSS-A 1185 1192 7 15 730400000.0
 144 BOSS-B 1185 1192 7 15 730400000.0
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 144 GUAM-B 1185 1192 7 15 730400000.0
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 146 POGO-C 1200 1245 45 15 047000000.0
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 146 LION-B 1200 1245 45 15 047000000.0
 146 GUAM-A 1200 1245 45 15 047000000.0
 146 GUAM-B 1200 1245 45 15 047000000.0
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 149 GUAM-A 1245 1300 25 15 944400000.0
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 150 REEF-A 1260 1340 20 15 316000000.0
 151 POGO-A 1260 1285 25 15 730400000.0
 151 POGO-B 1260 1285 25 15 730400000.0
 151 POGO-C 1260 1285 25 15 730400000.0

151 HULA-A 1260 1285 25 15 730400000.0
 151 HULA-B 1260 1285 25 15 730400000.0
 151 COOK-A 1260 1285 25 15 730400000.0
 151 COOK-B 1260 1285 25 15 730400000.0
 151 INDI-A 1260 1285 25 15 730400000.0
 151 BOSS-A 1260 1285 25 15 730400000.0
 151 BOSS-B 1260 1285 25 15 730400000.0
 151 LION-A 1260 1285 25 15 730400000.0
 151 LION-B 1260 1285 25 15 730400000.0
 151 GUAM-A 1260 1285 25 15 730400000.0
 151 GUAM-B 1260 1285 25 15 730400000.0
 151 PIKE-A 1260 1285 25 15 730400000.0
 151 REEF-A 1260 1285 25 15 730400000.0
 152 POGO-A 1265 1300 25 15 601200000.0
 152 POGO-B 1265 1300 25 15 601200000.0
 152 POGO-C 1265 1300 25 15 601200000.0
 152 HULA-A 1265 1300 25 15 601200000.0
 152 HULA-B 1265 1300 25 15 601200000.0
 152 COOK-A 1265 1300 25 15 601200000.0
 152 COOK-B 1265 1300 25 15 601200000.0
 152 INDI-A 1265 1300 25 15 601200000.0
 152 BOSS-A 1265 1300 25 15 601200000.0
 152 BOSS-B 1265 1300 25 15 601200000.0
 152 LION-A 1265 1300 25 15 601200000.0
 152 LION-B 1265 1300 25 15 601200000.0
 152 GUAM-A 1265 1300 25 15 601200000.0
 152 GUAM-B 1265 1300 25 15 601200000.0
 152 PIKE-A 1265 1300 25 15 601200000.0
 153 BOSS-A 1280 1310 10 15 403500000.0
 153 BOSS-B 1280 1310 10 15 403500000.0
 153 LION-A 1280 1310 10 15 403500000.0
 153 LION-B 1280 1310 10 15 403500000.0
 154 BOSS-A 1290 1365 15 15 071200000.0
 154 BOSS-B 1290 1365 15 15 071200000.0
 154 LION-A 1290 1365 15 15 071200000.0
 154 LION-B 1290 1365 15 15 071200000.0
 154 PIKE-A 1290 1365 15 15 071200000.0
 155 POGO-A 1290 1360 40 15 889600000.0
 155 POGO-B 1290 1360 40 15 889600000.0
 155 POGO-C 1290 1360 40 15 889600000.0
 155 HULA-A 1290 1360 40 15 889600000.0
 155 HULA-B 1290 1360 40 15 889600000.0
 155 INDI-A 1290 1360 40 15 889600000.0
 155 BOSS-A 1290 1360 40 15 889600000.0
 155 BOSS-B 1290 1360 40 15 889600000.0
 155 LION-A 1290 1360 40 15 889600000.0
 155 LION-B 1290 1360 40 15 889600000.0
 155 GUAM-A 1290 1360 40 15 889600000.0
 155 GUAM-B 1290 1360 40 15 889600000.0
 155 PIKE-A 1290 1360 40 15 889600000.0
 155 REEF-A 1290 1360 40 15 889600000.0
 156 POGO-A 1290 1350 15 15 979400000.0
 156 POGO-B 1290 1350 15 15 979400000.0

156 POGO-C 1290 1350 15 15 979400000.0
 156 HULA-A 1290 1350 15 15 979400000.0
 156 HULA-B 1290 1350 15 15 979400000.0
 156 COOK-A 1290 1350 15 15 979400000.0
 156 COOK-B 1290 1350 15 15 979400000.0
 156 INDI-A 1290 1350 15 15 979400000.0
 156 BOSS-A 1290 1350 15 15 979400000.0
 156 BOSS-B 1290 1350 15 15 979400000.0
 156 LION-A 1290 1350 15 15 979400000.0
 156 LION-B 1290 1350 15 15 979400000.0
 156 GUAM-A 1290 1350 15 15 979400000.0
 156 GUAM-B 1290 1350 15 15 979400000.0
 156 PIKE-A 1290 1350 15 15 979400000.0
 156 REEF-A 1290 1350 15 15 979400000.0
 157 POGO-A 1320 1485 165 15 372600000.0
 157 POGO-B 1320 1485 165 15 372600000.0
 157 POGO-C 1320 1485 165 15 372600000.0
 157 HULA-A 1320 1485 165 15 372600000.0
 157 HULA-B 1320 1485 165 15 372600000.0
 157 COOK-A 1320 1485 165 15 372600000.0
 157 COOK-B 1320 1485 165 15 372600000.0
 157 INDI-A 1320 1485 165 15 372600000.0
 157 BOSS-A 1320 1485 165 15 372600000.0
 157 BOSS-B 1320 1485 165 15 372600000.0
 157 LION-A 1320 1485 165 15 372600000.0
 157 LION-B 1320 1485 165 15 372600000.0
 157 GUAM-A 1320 1485 165 15 372600000.0
 157 GUAM-B 1320 1485 165 15 372600000.0
 157 PIKE-A 1320 1485 165 15 372600000.0
 158 POGO-A 1320 1330 10 15 730400000.0
 158 POGO-B 1320 1330 10 15 730400000.0
 158 POGO-C 1320 1330 10 15 730400000.0
 158 HULA-A 1320 1330 10 15 730400000.0
 158 HULA-B 1320 1330 10 15 730400000.0
 158 COOK-A 1320 1330 10 15 730400000.0
 158 COOK-B 1320 1330 10 15 730400000.0
 158 INDI-A 1320 1330 10 15 730400000.0
 158 BOSS-A 1320 1330 10 15 730400000.0
 158 BOSS-B 1320 1330 10 15 730400000.0
 158 LION-A 1320 1330 10 15 730400000.0
 158 LION-B 1320 1330 10 15 730400000.0
 158 GUAM-A 1320 1330 10 15 730400000.0
 158 GUAM-B 1320 1330 10 15 730400000.0
 158 PIKE-A 1320 1330 10 15 730400000.0
 158 REEF-A 1320 1330 10 15 730400000.0
 159 HULA-A 1325 1395 10 15 607100000.0
 159 HULA-B 1325 1395 10 15 607100000.0
 159 COOK-A 1325 1395 10 15 607100000.0
 159 COOK-B 1325 1395 10 15 607100000.0
 159 BOSS-A 1325 1395 10 15 607100000.0
 159 BOSS-B 1325 1395 10 15 607100000.0
 159 PIKE-A 1325 1395 10 15 607100000.0
 160 INDI-A 1350 1430 20 15 316000000.0

160 GUAM-A 1350 1430 20 15 316000000.0
 160 GUAM-B 1350 1430 20 15 316000000.0
 160 REEF-A 1350 1430 20 15 316000000.0
 161 INDI-A 1355 1390 35 15 532900000.0
 161 LION-A 1355 1390 35 15 532900000.0
 161 LION-B 1355 1390 35 15 532900000.0
 161 REEF-A 1355 1390 35 15 532900000.0
 162 POGO-A 1355 1368 13 15 601200000.0
 162 POGO-B 1355 1368 13 15 601200000.0
 162 POGO-C 1355 1368 13 15 601200000.0
 162 HULA-A 1355 1368 13 15 601200000.0
 162 HULA-B 1355 1368 13 15 601200000.0
 162 COOK-A 1355 1368 13 15 601200000.0
 162 COOK-B 1355 1368 13 15 601200000.0
 162 INDI-A 1355 1368 13 15 601200000.0
 162 BOSS-A 1355 1368 13 15 601200000.0
 162 BOSS-B 1355 1368 13 15 601200000.0
 162 LION-A 1355 1368 13 15 601200000.0
 162 LION-B 1355 1368 13 15 601200000.0
 162 GUAM-A 1355 1368 13 15 601200000.0
 162 GUAM-B 1355 1368 13 15 601200000.0
 162 PIKE-A 1355 1368 13 15 601200000.0
 163 COOK-A 1365 1430 5 15 827500000.0
 163 COOK-B 1365 1430 5 15 827500000.0
 163 BOSS-A 1365 1430 5 15 827500000.0
 163 BOSS-B 1365 1430 5 15 827500000.0
 163 LION-A 1365 1430 5 15 827500000.0
 163 LION-B 1365 1430 5 15 827500000.0
 163 PIKE-A 1365 1430 5 15 827500000.0
 164 BOSS-A 1380 1420 20 15 212400000.0

164 BOSS-B 1380 1420 20 15 212400000.0
 164 LION-A 1380 1420 20 15 212400000.0
 164 LION-B 1380 1420 20 15 212400000.0
 164 PIKE-A 1380 1460 20 15 212400000.0
 165 INDI-A 1390 1445 55 15 532900000.0
 165 REEF-A 1390 1445 55 15 532900000.0
 166 INDI-A 1395 1465 10 15 484500000.0
 166 LION-A 1395 1430 10 15 484500000.0
 166 LION-B 1395 1430 10 15 484500000.0
 166 REEF-A 1395 1430 10 15 484500000.0
 167 INDI-A 1410 1460 20 15 577500000.0
 168 BOSS-A 1415 1435 20 15 503700000.0
 168 BOSS-B 1415 1435 20 15 503700000.0
 168 LION-A 1415 1435 20 15 503700000.0
 168 LION-B 1415 1435 20 15 503700000.0
 169 POGO-A 1415 1470 35 15 601200000.0
 169 POGO-B 1415 1470 35 15 601200000.0
 169 POGO-C 1415 1470 35 15 601200000.0
 169 HULA-A 1415 1470 35 15 601200000.0
 169 HULA-B 1415 1470 35 15 601200000.0
 169 COOK-A 1415 1470 35 15 601200000.0
 169 COOK-B 1415 1470 35 15 601200000.0
 169 INDI-A 1415 1470 35 15 601200000.0
 169 BOSS-A 1415 1470 35 15 601200000.0
 169 BOSS-B 1415 1470 35 15 601200000.0
 169 LION-A 1415 1470 35 15 601200000.0
 169 LION-B 1415 1470 35 15 601200000.0
 169 GUAM-A 1415 1470 35 15 601200000.0
 169 GUAM-B 1415 1470 35 15 601200000.0
 169 PIKE-A 1415 1470 35 15 601200000.0

SUBSCH.PAS. Subtract schedule. This PASCAL program takes scheduled activities and subtracts the scheduled time block from that particular RTS side's support request possibilities in the block of requests about to be scheduled. If the scheduled activity intersects a portion of a request and the support can be scheduled in that portion of the tolerance window that remains, the request's tolerance will be altered. If a tolerance window remains on either side of the subtracted scheduled activity, the larger of the two windows will be returned. If the subtraction of the scheduled activity leaves a tolerance window smaller than the requested support duration, that RTS side scheduling window will not be returned.

program subsch;
 Type

```

Var
  hfn,flg,bvn,evn,durn,tatn,hfn1,bvn1,bsn1,evn1,bvnh,evnh,durn1,tatn1: integer;
  gts,gts1: string[7];
  fill : string[10];
fill1 : string[10];
revv,revlf,revhf :real;
dum:STRING[9];
Infile,Infile1,OutFile1,outfile2,infile3,outfile3,outfile4,outfile,infile2 : Text;
Begin {Main Program}
  Assign(Infile1,'c:\requp.dat');
  Reset(Infile1);
  Assign(infile,'c:schup.dat');
  Reset(infile);
  Assign(Outfile,'C:\trash.dat');
  Rewrite(Outfile);
  Assign(Outfile1,'C:\req.dat');
  Rewrite(Outfile1);
  Assign(infile2,'c:schl9.dat');
  Reset(infile2);
  Assign(infile3,'c:fschl7.dat');
  Reset(infile3);
  Writeln('Reading Data');
  repeat
    Readln (Infile1,hfn,gts,bvn,evn,durn,tatn,fill);
    reset(infile);
    flg:=0;
    bvnh:=0;
    evnh:=10000;
    repeat
      readln (infile,hfn1,gts1,bvn1,evn1,durn1,tatn1,fill1);
    if gts=gts1 then
      begin
        bsn1:=bvn1-20;
        if (bvn>bsn1)and(bvn<evn1)and((durn+15)<(evn-evn1)) then bvn:=evn1+15;
        if (bvn>bsn1)and(bvn<evn1)and((durn+15)>(evn-evn1)) then flg:=1;
        if (evn>bsn1)and(evn<evn1)and(durn<(bsn1-bvn)) then evn:=bsn1;
        if (evn>bsn1)and(evn<evn1)and(durn>(bsn1-bvn)) then flg:=1;
        if(bvn1>bvn)and(evn1<evn)and((durn<(bsn1-bvn))or(durn<(evn-evn1))) then
          begin
            if(bsn1-bvn)>(evn-evn1-15) then evn:=bsn1;
            if(bsn1-bvn)<(evn-evn1-15) then bvn:=evn1+15;
          end;
        if(bvn1>bvn)and(evn1<evn)and((durn>(bsn1-bvn))and((durn+15)>(evn-evn1))) then flg:=1;
        if ((bvn-evn1)>0)and((bvn-evn1)<15) then bvn:=evn1+15;
        if bvn>bvnh then bvnh:=bvn;
        if evn<evnh then evnh:=evn;
      end;
    until eof(infile);
    if bvnh=0 then bvnh:=bvn;
    if evnh=10000 then evnh:=evn;
    if (evnh-bvnh)<durn then flg:=1;
  if flg=0 then writeln(outfile1,hfn:4,gts,bvnh:5,evnh:5,durn:5,tatn:3,fill);
  bvnh:=0;

```

```

        evnh:=10000;
        until EOF (infile1);
    reset(outfile1);
    repeat
        readln(outfile1);
    until eof(outfile1);
    reset(outfile1);
    repeat
Readln (outfile1,hfn,gts,bvn,evn,durn,tatn,fill);
        reset(infile2);
        flg:=0;
        bvnh:=0;
        evnh:=10000;
        repeat
            readln (infile2,hfn1,gts1,bvn1,evn1,durn1,tatn1,fill1);
            if gts=gts1 then
                begin
                    bvn1:=bvn1+1440;
                    evn1:=evn1+1440;
                    bsn1:=bvn1-20;
                    if (bvn>bsn1)and(bvn<evn1)and((durn+15)<(evn-evn1)) then bvn:=evn1+15;
                    if (bvn>bsn1)and(bvn<evn1)and((durn+15)>(evn-evn1)) then flg:=1;
                    if (evn>bsn1)and(evn<evn1)and(durn<(bsn1-bvn)) then evn:=bsn1;
                    if (evn>bsn1)and(evn<evn1)and(durn>(bsn1-bvn)) then flg:=1;
                    if(bvn1>bvn)and(evn1<evn)and((durn<(bsn1-bvn))or(durn<(evn-evn1))) then
                        begin
                            if(bsn1-bvn)>(evn-evn1-15) then evn:=bsn1;
                            if(bsn1-bvn)<(evn-evn1-15) then bvn:=evn1+15;
                        end;
                    if(bvn1>bvn)and(evn1<evn)and((durn>(bsn1-bvn))and((durn+15)>(evn-evn1))) then flg:=1;
                    if ((bvn-evn1)>0)and((bvn-evn1)<15) then bvn:=evn1+15;
                    if bvn>bvnh then bvnh:=bvn;
                    if evn<evnh then evnh:=evn;
                end;
            until eof(infile2);
            if bvnh=0 then bvnh:=bvn;
            if evnh=10000 then evnh:=evn;
            if (evnh-bvnh)<durn then flg:=1;
        if flg=0 then writeln(outfile,hfn,gts,bvnh:5,evnh:5,durn:5,tatn:3,fill);
            bvnh:=0;
            evnh:=10000;
            until EOF (outfile1);
        reset(outfile);
        repeat
            readln(outfile);
        until eof(outfile);
        reset(outfile);
        rewrite(outfile1);
        repeat
Readln (outfile,hfn,gts,bvn,evn,durn,tatn,fill);
            reset(infile3);
            flg:=0;
            bvnh:=0;

```

```

        evnh:=10000;
        repeat
            readln (infile3,hfn1,gts1,bvn1,evn1,durn1,tatn1,fill1);
            if gts=gts1 then
                begin
                    bvn1:=bvn1-1440;
                    evn1:=evn1-1440;
                    bsn1:=bvn1-20;
                    if (bvn>bsn1)and(bvn<evn1)and((durn+15)<(evn-evn1)) then bvn:=evn1+15;
                    if (bvn>bsn1)and(bvn<evn1)and((durn+15)>(evn-evn1)) then flg:=1;
                    if (evn>bsn1)and(evn<evn1)and(durn<(bsn1-bvn)) then evn:=bsn1;
                    if (evn>bsn1)and(evn<evn1)and(durn>(bsn1-bvn)) then flg:=1;
                    if (bvn1>bvn)and(evn1<evn)and((durn<(bsn1-bvn))or(durn<(evn-evn1))) then
                        begin
                            if (bsn1-bvn)>(evn-evn1-15) then evn:=bsn1;
                            if (bsn1-bvn)<(evn-evn1-15) then bvn:=evn1+15;
                        end;
                    if (bvn1>bvn)and(evn1<evn)and((durn>(bsn1-bvn))and((durn+15)>(evn-evn1))) then flg:=1;
                    if ((bvn-evn1)>0)and((bvn-evn1)<15) then bvn:=evn1+15;
                    if bvn>bvn1 then bvn:=bvn1;
                    if evn<evnh then evnh:=evn;
                end;
            until eof(infile3);
            if bvn1=0 then bvn:=bvn1;
            if evnh=10000 then evnh:=evn;
            if (evnh-bvn1)<durn then flg:=1;
        if flg=0 then writeln(outfile1,hfn:4,gts,bvn1:5,evnh:5,durn:5,tatn:3,fill);
            bvn1:=0;
            evnh:=10000;
            until EOF (outfile);
        reset(outfile1);
        repeat
            readln(outfile1);
            until eof(outfile1);
        end.

```

RTS.PAS Output (Medium and high altitude satellite support requests).

1 HULA-A 0 50 35 15 944500000	3 PIKE-A 0 65 5 15 827500000
1 HULA-B 0 50 35 15 944500000	4 BOSS-A 0 5 5 15 628000000
1 GUAM-A 0 50 35 15 944500000	4 BOSS-B 0 5 5 15 628000000
1 GUAM-B 0 50 35 15 944500000	4 LION-A 0 5 5 15 628000000
1 REEF-A 0 50 35 15 944500000	4 LION-B 0 5 5 15 628000000
2 LION-A 0 45 15 15 256700000	5 POGO-B 5 31 10 15 731000000
2 LION-B 0 45 15 15 256700000	5 POGO-C 5 35 10 15 731000000
2 REEF-A 0 45 15 15 256700000	5 HULA-A 5 35 10 15 731000000
3 COOK-A 0 34 5 15 827500000	5 HULA-B 5 35 10 15 731000000
3 COOK-B 0 34 5 15 827500000	5 COOK-A 5 34 10 15 731000000
3 BOSS-A 0 19 5 15 827500000	5 COOK-B 5 34 10 15 731000000
3 BOSS-B 0 65 5 15 827500000	5 BOSS-A 5 19 10 15 731000000
3 LION-A 0 65 5 15 827500000	5 BOSS-B 5 35 10 15 731000000
3 LION-B 0 65 5 15 827500000	5 PIKE-A 5 35 10 15 731000000

6 BOSS-B 10 20 10 15 639100000
 6 LION-A 10 20 10 15 639100000
 6 LION-B 10 20 10 15 639100000
 7 POGO-C 30 75 45 15 863900000
 7 HULA-A 30 75 45 15 863900000
 7 HULA-B 30 75 45 15 863900000
 7 LION-A 30 75 45 15 863900000
 7 LION-B 30 75 45 15 863900000
 7 GUAM-A 30 75 45 15 863900000
 7 GUAM-B 30 75 45 15 863900000
 7 PIKE-A 30 75 45 15 863900000
 8 HULA-A 30 110 20 15 595300000
 8 HULA-B 30 110 20 15 595300000
 8 COOK-A 82 110 20 15 595300000
 8 COOK-B 83 110 20 15 595300000
 8 GUAM-A 30 88 20 15 595300000
 8 GUAM-B 30 110 20 15 595300000
 8 PIKE-A 30 110 20 15 595300000
 9 POGO-A 57 90 15 15 047000000
 9 POGO-C 45 90 15 15 047000000
 9 BOSS-A 70 90 15 15 047000000
 9 BOSS-B 45 90 15 15 047000000
 9 LION-A 45 90 15 15 047000000
 9 LION-B 45 90 15 15 047000000
 9 PIKE-A 45 90 15 15 047000000
 10 BOSS-B 45 480 435 15 503700000
 11 INDI-A 54 64 10 15 495500000
 11 BOSS-B 54 64 10 15 495500000
 11 LION-A 54 64 10 15 495500000
 11 LION-B 54 64 10 15 495500000
 12 BOSS-B 60 360 300 15 503700000
 13 BOSS-B 60 85 25 15 403500000
 13 LION-A 60 85 25 15 403500000
 13 LION-B 60 85 25 15 403500000
 14 POGO-A 65 125 15 15 952100000
 14 POGO-B 79 118 15 15 952100000
 14 POGO-C 65 125 15 15 952100000
 14 INDI-A 65 125 15 15 952100000
 14 BOSS-A 72 97 15 15 952100000
 14 BOSS-B 72 125 15 15 952100000
 14 LION-A 65 125 15 15 952100000
 14 LION-B 65 125 15 15 952100000
 14 GUAM-A 65 88 15 15 952100000
 14 GUAM-B 65 125 15 15 952100000
 14 REEF-A 108 125 15 15 952100000
 15 POGO-A 70 105 35 15 783700000
 15 POGO-C 70 105 35 15 783700000
 15 LION-A 70 105 35 15 783700000
 15 LION-B 70 105 35 15 783700000
 15 GUAM-B 70 105 35 15 783700000
 15 PIKE-A 70 105 35 15 783700000
 16 HULA-A 90 119 15 15 645300000
 16 HULA-B 90 165 15 15 645300000

16 COOK-A 90 165 15 15 645300000
 16 COOK-B 90 165 15 15 645300000
 16 GUAM-A 138 165 15 15 645300000
 16 GUAM-B 90 165 15 15 645300000
 17 POGO-A 90 149 10 15 944200000
 17 POGO-B 90 118 10 15 944200000
 17 POGO-C 90 130 10 15 944200000
 17 COOK-A 90 160 10 15 944200000
 17 COOK-B 90 160 10 15 944200000
 17 INDI-A 90 159 10 15 944200000
 17 BOSS-B 90 160 10 15 944200000
 17 LION-A 90 160 10 15 944200000
 17 LION-B 90 160 10 15 944200000
 17 PIKE-A 90 118 10 15 944200000
 18 INDI-A 90 159 20 15 577500000
 18 LION-A 90 170 20 15 577500000
 18 LION-B 90 170 20 15 577500000
 18 GUAM-B 90 170 20 15 577500000
 18 REEF-A 108 170 20 15 577500000
 19 POGO-A 105 149 15 15 863900000
 19 POGO-C 105 130 15 15 863900000
 19 HULA-B 105 165 15 15 863900000
 19 COOK-A 105 143 15 15 863900000
 19 COOK-B 105 143 15 15 863900000
 19 BOSS-B 105 143 15 15 863900000
 19 LION-A 105 143 15 15 863900000
 19 LION-B 105 143 15 15 863900000
 19 GUAM-A 138 165 15 15 863900000
 19 GUAM-B 105 165 15 15 863900000
 20 BOSS-B 111 126 15 15 936600000
 20 LION-A 111 126 15 15 936600000
 20 LION-B 111 126 15 15 936600000
 21 COOK-A 145 180 15 15 750600000
 21 COOK-B 145 180 15 15 750600000
 21 BOSS-B 145 180 15 15 750600000
 21 LION-A 145 180 15 15 750600000
 21 LION-B 145 180 15 15 750600000
 22 POGO-B 167 195 20 15 731000000
 22 HULA-A 168 195 20 15 731000000
 22 HULA-B 155 195 20 15 731000000
 22 COOK-A 155 195 20 15 731000000
 22 COOK-B 155 195 20 15 731000000
 22 INDI-A 155 195 20 15 731000000
 22 BOSS-B 155 195 20 15 731000000
 22 LION-A 155 195 20 15 731000000
 22 LION-B 155 195 20 15 731000000
 22 PIKE-A 169 195 20 15 731000000
 23 BOSS-A 190 235 10 15 071200000
 23 BOSS-B 165 235 10 15 071200000
 23 LION-A 165 205 10 15 071200000
 23 LION-B 165 224 10 15 071200000
 23 PIKE-A 169 218 10 15 071200000
 24 BOSS-B 165 170 5 15 403500000

24 LION-A 165 170 5 15 403500000
 24 LION-B 165 170 5 15 403500000
 25 GUAM-B 170 190 20 15 316000000
 26 GUAM-A 202 235 25 15 614200000
 26 GUAM-B 180 235 25 15 614200000
 27 POGO-B 180 206 5 15 639200000
 27 POGO-C 180 214 5 15 639200000
 27 INDI-A 210 245 5 15 639200000
 27 BOSS-A 190 245 5 15 639200000
 27 BOSS-B 180 245 5 15 639200000
 27 LION-A 180 205 5 15 639200000
 27 LION-B 180 224 5 15 639200000
 27 PIKE-A 180 218 5 15 639200000
 28 INDI-A 210 270 20 15 532900000
 28 REEF-A 222 270 20 15 532900000
 29 HULA-B 205 240 15 15 722500000
 29 COOK-A 205 240 15 15 722500000
 29 COOK-B 205 240 15 15 722500000
 29 GUAM-A 205 240 15 15 722500000
 29 GUAM-B 205 240 15 15 722500000
 30 INDI-A 210 275 40 15 889600000
 30 BOSS-A 205 275 40 15 889600000
 30 BOSS-B 205 275 40 15 889600000
 30 REEF-A 222 275 40 15 889600000
 31 HULA-A 269 285 15 15 944100000
 31 HULA-B 210 285 15 15 944100000
 31 COOK-A 210 285 15 15 944100000
 31 COOK-B 210 285 15 15 944100000
 31 BOSS-A 210 285 15 15 944100000
 31 BOSS-B 210 285 15 15 944100000
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 121 GUAM-A 1010 1040 10 15 750600000
 121 PIKE-A 1010 1040 10 15 750600000
 121 REEF-A 1010 1040 10 15 750600000
 122 BOSS-A 1020 1050 20 15 212400000
 122 BOSS-B 1020 1079 20 15 212400000
 122 LION-A 1067 1100 20 15 212400000
 122 LION-B 1078 1100 20 15 212400000
 122 PIKE-A 1020 1100 20 15 212400000
 123 POGO-B 1020 1042 15 15 673800000
 123 HULA-B 1020 1059 15 15 673800000
 123 COOK-A 1020 1080 15 15 673800000
 123 COOK-B 1020 1080 15 15 673800000
 123 INDI-A 1054 1080 15 15 673800000
 123 BOSS-A 1020 1050 15 15 673800000
 123 BOSS-B 1020 1079 15 15 673800000
 123 GUAM-A 1020 1078 15 15 673800000
 123 GUAM-B 1065 1080 15 15 673800000
 123 PIKE-A 1020 1080 15 15 673800000

123 REEF-A 1020 1080 15 15 673800000
 124 HULA-A 1051 1059 5 15 639400000
 124 HULA-B 1035 1059 5 15 639400000
 124 COOK-A 1035 1100 5 15 639400000
 124 COOK-B 1035 1100 5 15 639400000
 124 GUAM-A 1035 1078 5 15 639400000
 124 GUAM-B 1065 1100 5 15 639400000
 125 BOSS-A 1040 1070 10 15 403500000
 125 BOSS-B 1040 1070 10 15 403500000
 126 INDI-A 1054 1115 5 15 484500000
 126 LION-A 1067 1115 5 15 484500000
 126 LION-B 1078 1109 5 15 484500000
 126 REEF-A 1050 1115 5 15 484500000
 127 POGO-B 1089 1100 10 15 722500000
 127 POGO-C 1076 1100 10 15 722500000
 127 COOK-A 1070 1100 10 15 722500000
 127 COOK-B 1070 1100 10 15 722500000
 127 INDI-A 1070 1100 10 15 722500000
 127 LION-A 1070 1100 10 15 722500000
 127 LION-B 1078 1100 10 15 722500000
 127 GUAM-B 1070 1100 10 15 722500000
 127 PIKE-A 1070 1100 10 15 722500000
 128 INDI-A 1080 1100 20 15 532900000
 128 LION-A 1080 1100 20 15 532900000
 128 LION-B 1080 1100 20 15 532900000
 128 REEF-A 1080 1100 20 15 532900000
 129 COOK-A 1080 1155 15 15 936400000
 129 COOK-B 1080 1155 15 15 936400000
 129 BOSS-A 1101 1118 15 15 936400000
 129 BOSS-B 1129 1155 15 15 936400000
 129 LION-A 1080 1130 15 15 936400000
 129 LION-B 1080 1109 15 15 936400000
 129 PIKE-A 1080 1152 15 15 936400000
 130 COOK-A 1080 1160 20 15 764100000
 130 COOK-B 1080 1160 20 15 764100000
 130 BOSS-B 1129 1160 20 15 764100000
 130 PIKE-A 1080 1152 20 15 764100000
 131 POGO-B 1089 1125 15 15 252400000
 131 POGO-C 1080 1140 15 15 252400000
 131 COOK-A 1080 1140 15 15 252400000
 131 COOK-B 1080 1140 15 15 252400000
 131 INDI-A 1080 1140 15 15 252400000
 131 BOSS-A 1101 1118 15 15 252400000
 131 LION-A 1080 1130 15 15 252400000
 131 LION-B 1080 1109 15 15 252400000
 131 GUAM-B 1080 1140 15 15 252400000
 131 PIKE-A 1080 1140 15 15 252400000
 131 REEF-A 1080 1140 15 15 252400000
 132 INDI-A 1105 1205 100 15 577500000
 132 GUAM-B 1105 1205 100 15 577500000
 132 REEF-A 1105 1205 100 15 577500000
 133 POGO-C 1105 1150 45 15 889600000
 133 INDI-A 1105 1150 45 15 889600000

133 GUAM-B 1105 1150 45 15 889600000
 133 PIKE-A 1105 1150 45 15 889600000
 133 REEF-A 1105 1150 45 15 889600000
 134 BOSS-A 1164 1180 10 15 503700000
 134 BOSS-B 1129 1180 10 15 503700000
 134 LION-A 1110 1130 10 15 503700000
 134 LION-B 1153 1180 10 15 503700000
 135 HULA-A 1110 1120 10 15 944300000
 135 HULA-B 1110 1120 10 15 944300000
 135 COOK-A 1110 1120 10 15 944300000
 135 COOK-B 1110 1120 10 15 944300000
 135 GUAM-B 1110 1120 10 15 944300000
 135 PIKE-A 1110 1120 10 15 944300000
 136 POGO-B 1110 1125 15 15 943400000
 136 POGO-C 1110 1151 15 15 943400000
 136 COOK-A 1110 1172 15 15 943400000
 136 COOK-B 1110 1185 15 15 943400000
 136 BOSS-A 1164 1185 15 15 943400000
 136 BOSS-B 1129 1185 15 15 943400000
 136 LION-A 1110 1130 15 15 943400000
 136 LION-B 1153 1185 15 15 943400000
 136 PIKE-A 1110 1152 15 15 943400000
 137 POGO-C 1115 1140 15 15 730400000
 137 HULA-A 1115 1140 15 15 730400000
 137 HULA-B 1115 1140 15 15 730400000
 137 COOK-A 1115 1140 15 15 730400000
 137 COOK-B 1115 1140 15 15 730400000
 137 INDI-A 1115 1140 15 15 730400000
 137 LION-A 1115 1140 15 15 730400000
 137 GUAM-B 1115 1140 15 15 730400000
 137 PIKE-A 1115 1140 15 15 730400000
 137 REEF-A 1115 1140 15 15 730400000
 138 INDI-A 1125 1190 5 15 452400000
 138 BOSS-A 1164 1190 5 15 452400000
 138 BOSS-B 1129 1190 5 15 452400000
 138 LION-A 1181 1190 5 15 452400000
 138 LION-B 1153 1190 5 15 452400000
 139 INDI-A 1130 1200 10 15 639100000
 139 BOSS-A 1164 1200 10 15 639100000
 139 BOSS-B 1130 1200 10 15 639100000
 139 LION-A 1181 1200 10 15 639100000
 139 LION-B 1153 1200 10 15 639100000
 140 POGO-A 1189 1227 10 15 731000000
 140 POGO-B 1173 1201 10 15 731000000
 140 POGO-C 1203 1230 10 15 731000000
 140 HULA-B 1130 1230 10 15 731000000
 140 COOK-A 1130 1172 10 15 731000000
 140 COOK-B 1130 1230 10 15 731000000
 140 INDI-A 1130 1230 10 15 731000000
 140 BOSS-A 1164 1212 10 15 731000000
 140 BOSS-B 1130 1230 10 15 731000000
 140 LION-A 1181 1230 10 15 731000000
 140 LION-B 1153 1230 10 15 731000000

140 GUAM-A 1196 1230 10 15 731000000
 140 GUAM-B 1130 1230 10 15 731000000
 140 PIKE-A 1203 1230 10 15 731000000
 140 REEF-A 1130 1211 10 15 731000000
 141 HULA-B 1140 1185 15 15 294100000
 141 COOK-A 1140 1172 15 15 294100000
 141 COOK-B 1140 1185 15 15 294100000
 141 BOSS-A 1164 1185 15 15 294100000
 141 BOSS-B 1140 1185 15 15 294100000
 141 LION-B 1153 1185 15 15 294100000
 141 GUAM-B 1140 1185 15 15 294100000
 141 REEF-A 1140 1185 15 15 294100000
 142 HULA-A 1196 1202 5 15 645100000
 142 HULA-B 1155 1220 5 15 645100000
 142 COOK-A 1155 1172 5 15 645100000
 142 COOK-B 1155 1220 5 15 645100000
 142 BOSS-A 1164 1212 5 15 645100000
 142 BOSS-B 1155 1220 5 15 645100000
 142 PIKE-A 1203 1220 5 15 645100000
 143 POGO-B 1173 1195 10 15 750600000
 143 HULA-B 1165 1195 10 15 750600000
 143 COOK-B 1165 1195 10 15 750600000
 143 INDI-A 1165 1195 10 15 750600000
 143 BOSS-A 1165 1195 10 15 750600000
 143 BOSS-B 1165 1195 10 15 750600000
 143 LION-A 1181 1195 10 15 750600000
 143 LION-B 1165 1195 10 15 750600000
 143 GUAM-B 1165 1195 10 15 750600000
 143 REEF-A 1165 1195 10 15 750600000
 144 POGO-B 1185 1192 7 15 730400000
 144 HULA-B 1185 1192 7 15 730400000
 144 COOK-B 1185 1192 7 15 730400000
 144 INDI-A 1185 1192 7 15 730400000
 144 BOSS-A 1185 1192 7 15 730400000
 144 BOSS-B 1185 1192 7 15 730400000
 144 LION-A 1185 1192 7 15 730400000
 144 LION-B 1185 1192 7 15 730400000
 144 GUAM-B 1185 1192 7 15 730400000
 144 REEF-A 1185 1192 7 15 730400000
 145 HULA-B 1190 1265 15 15 731400000
 145 COOK-A 1221 1254 15 15 731400000
 145 COOK-B 1190 1265 15 15 731400000
 145 BOSS-A 1190 1212 15 15 731400000
 145 BOSS-B 1190 1244 15 15 731400000
 145 PIKE-A 1203 1265 15 15 731400000
 146 HULA-B 1200 1245 45 15 047000000
 146 COOK-B 1200 1245 45 15 047000000
 146 INDI-A 1200 1245 45 15 047000000
 146 LION-B 1200 1245 45 15 047000000
 146 GUAM-A 1200 1245 45 15 047000000
 146 GUAM-B 1200 1245 45 15 047000000
 147 INDI-A 1210 1220 10 15 483200000
 147 LION-A 1210 1220 10 15 483200000

147 LION-B 1210 1220 10 15 483200000
 148 BOSS-A 1262 1280 5 15 936600000
 148 BOSS-B 1215 1280 5 15 936600000
 148 LION-A 1215 1232 5 15 936600000
 148 LION-B 1215 1280 5 15 936600000
 148 PIKE-A 1215 1280 5 15 936600000
 149 INDI-A 1245 1300 25 15 944400000
 149 LION-B 1245 1300 25 15 944400000
 149 GUAM-B 1245 1300 25 15 944400000
 149 REEF-A 1263 1300 25 15 944400000
 150 INDI-A 1260 1313 20 15 316000000
 150 GUAM-A 1314 1340 20 15 316000000
 150 GUAM-B 1260 1340 20 15 316000000
 150 REEF-A 1263 1340 20 15 316000000
 151 POGO-C 1260 1285 25 15 730400000
 151 HULA-B 1260 1285 25 15 730400000
 151 INDI-A 1260 1285 25 15 730400000
 151 LION-B 1260 1285 25 15 730400000
 151 GUAM-B 1260 1285 25 15 730400000
 151 PIKE-A 1260 1285 25 15 730400000
 152 POGO-C 1265 1300 25 15 601200000
 152 HULA-B 1265 1300 25 15 601200000
 152 INDI-A 1265 1300 25 15 601200000
 152 BOSS-A 1265 1300 25 15 601200000
 152 LION-B 1265 1300 25 15 601200000
 152 GUAM-B 1265 1300 25 15 601200000
 152 PIKE-A 1265 1300 25 15 601200000
 153 BOSS-A 1280 1307 10 15 403500000
 153 BOSS-B 1280 1310 10 15 403500000
 153 LION-A 1282 1310 10 15 403500000
 153 LION-B 1280 1310 10 15 403500000
 154 BOSS-A 1290 1307 15 15 071200000
 154 BOSS-B 1295 1332 15 15 071200000
 154 LION-A 1290 1365 15 15 071200000
 154 LION-B 1290 1365 15 15 071200000
 154 PIKE-A 1290 1365 15 15 071200000
 155 HULA-A 1290 1360 40 15 889600000
 155 HULA-B 1290 1360 40 15 889600000
 155 LION-A 1290 1360 40 15 889600000
 155 LION-B 1290 1360 40 15 889600000
 155 GUAM-B 1290 1360 40 15 889600000
 155 PIKE-A 1290 1360 40 15 889600000
 155 REEF-A 1290 1350 40 15 889600000
 156 POGO-B 1290 1315 15 15 979400000
 156 POGO-C 1290 1329 15 15 979400000
 156 HULA-A 1290 1350 15 15 979400000
 156 HULA-B 1290 1350 15 15 979400000
 156 COOK-A 1290 1350 15 15 979400000
 156 COOK-B 1323 1350 15 15 979400000
 156 INDI-A 1290 1313 15 15 979400000
 156 BOSS-A 1290 1307 15 15 979400000
 156 BOSS-B 1295 1332 15 15 979400000
 156 LION-A 1290 1350 15 15 979400000

156 LION-B 1290 1350 15 15 979400000
 156 GUAM-A 1314 1346 15 15 979400000
 156 GUAM-B 1290 1350 15 15 979400000
 156 PIKE-A 1290 1350 15 15 979400000
 156 REEF-A 1290 1350 15 15 979400000
 157 HULA-A 1320 1485 165 15 372600000
 157 HULA-B 1320 1485 165 15 372600000
 157 LION-A 1320 1485 165 15 372600000
 157 LION-B 1320 1485 165 15 372600000
 157 GUAM-B 1320 1485 165 15 372600000
 157 PIKE-A 1320 1485 165 15 372600000
 158 HULA-A 1320 1330 10 15 730400000
 158 HULA-B 1320 1330 10 15 730400000
 158 COOK-A 1320 1330 10 15 730400000
 158 BOSS-B 1320 1330 10 15 730400000
 158 LION-A 1320 1330 10 15 730400000
 158 LION-B 1320 1330 10 15 730400000
 158 GUAM-A 1320 1330 10 15 730400000
 158 GUAM-B 1320 1330 10 15 730400000
 158 PIKE-A 1320 1330 10 15 730400000
 158 REEF-A 1320 1330 10 15 730400000
 159 HULA-A 1325 1395 10 15 607100000
 159 HULA-B 1325 1395 10 15 607100000
 159 COOK-A 1325 1395 10 15 607100000
 159 COOK-B 1325 1395 10 15 607100000
 159 BOSS-B 1379 1395 10 15 607100000
 159 PIKE-A 1325 1395 10 15 607100000
 160 GUAM-A 1395 1430 20 15 316000000
 160 GUAM-B 1350 1430 20 15 316000000
 160 REEF-A 1399 1430 20 15 316000000
 161 LION-A 1355 1390 35 15 532900000
 161 LION-B 1355 1390 35 15 532900000
 162 HULA-A 1355 1368 13 15 601200000
 162 HULA-B 1355 1368 13 15 601200000
 162 COOK-A 1355 1368 13 15 601200000
 162 COOK-B 1355 1368 13 15 601200000
 162 LION-A 1355 1368 13 15 601200000
 162 LION-B 1355 1368 13 15 601200000
 162 GUAM-B 1355 1368 13 15 601200000
 162 PIKE-A 1355 1368 13 15 601200000
 163 COOK-A 1365 1408 5 15 827500000
 163 COOK-B 1365 1406 5 15 827500000
 163 BOSS-A 1395 1408 5 15 827500000
 163 BOSS-B 1379 1430 5 15 827500000
 163 LION-A 1365 1430 5 15 827500000
 163 LION-B 1365 1430 5 15 827500000
 163 PIKE-A 1365 1430 5 15 827500000
 164 BOSS-A 1380 1408 20 15 212400000
 164 BOSS-B 1380 1420 20 15 212400000
 164 LION-A 1380 1420 20 15 212400000
 164 LION-B 1380 1420 20 15 212400000
 164 PIKE-A 1380 1460 20 15 212400000
 166 INDI-A 1416 1465 10 15 484500000

166 LION-A 1395 1430 10 15 484500000
 166 LION-B 1395 1430 10 15 484500000
 166 REEF-A 1399 1430 10 15 484500000
 167 INDI-A 1416 1460 20 15 577500000
 168 BOSS-B 1415 1435 20 15 503700000
 168 LION-A 1415 1435 20 15 503700000
 168 LION-B 1415 1435 20 15 503700000
 169 POGO-A 1415 1470 35 15 601200000
 169 POGO-B 1415 1470 35 15 601200000
 169 POGO-C 1415 1470 35 15 601200000

169 HULA-A 1415 1470 35 15 601200000
 169 HULA-B 1415 1470 35 15 601200000
 169 INDI-A 1416 1470 35 15 601200000
 169 BOSS-B 1415 1470 35 15 601200000
 169 LION-A 1415 1470 35 15 601200000
 169 LION-B 1415 1470 35 15 601200000
 169 GUAM-A 1415 1470 35 15 601200000
 169 GUAM-B 1415 1470 35 15 601200000
 169 PIKE-A 1415 1470 35 15 601200000

Like the low altitude satellite support requests, the above medium and high altitude satellite support requests are ported to the VAX 6420 and submitted to **IPLINK.FOR**. The output from **IPLINK.FOR** is submitted to **SRS.GMS** where the schedule variables are found. These files are submitted to **SCHUP.PAS** where the scheduled requests are added to the previous schedule.

SCHUP.PAS Output (Final 24 Hour Schedule).

1 HULA-A 0 35 35 15 9445000
 2 LION-A 0 15 15 15 2567000
 3 COOK-A 0 5 5 15 8275000
 4 BOSS-A 0 5 5 15 6280000
 5 POGO-B 5 15 10 15 7310000
 6 BOSS-B 10 20 10 15 6391000
 1 INDI-A 13 28 15 15 6553055
 2 POGO-A 26 42 16 15 2532097
 7 POGO-C 30 75 45 15 8639000
 8 HULA-B 30 50 20 15 5953000
 3 BOSS-A 39 55 16 15 9757024
 10 BOSS-B 45 480 435 15 5037000
 4 POGO-B 51 64 13 15 1056014
 11 INDI-A 54 64 10 15 4955000
 5 COOK-A 54 67 13 15 4774042
 6 COOK-B 54 68 14 15 6553055
 9 POGO-A 57 72 15 15 0470000
 13 LION-A 60 85 25 15 4035000
 15 GUAM-B 70 105 35 15 7837000
 7 REEF-A 81 93 12 15 9757024
 14 POGO-A 87 102 15 15 9521000
 16 HULA-A 90 105 15 15 6453000
 17 POGO-C 90 100 10 15 9442000
 18 INDI-A 90 110 20 15 5775000
 19 LION-B 105 120 15 15 8639000
 8 GUAM-A 108 123 15 15 7050006
 20 LION-A 111 126 15 15 9366000
 9 BOSS-A 117 133 16 15 2532097
 10 POGO-B 138 152 14 15 6553055
 11 PIKE-A 138 154 16 15 9757024
 12 HULA-A 139 153 14 15 0286045

21 COOK-A 145 160 15 15 7506000
 13 POGO-C 150 163 13 15 1056014
 14 BOSS-A 163 175 12 15 5821064
 24 LION-A 165 170 5 15 4035000
 22 POGO-B 167 187 20 15 7310000
 15 POGO-A 169 179 10 15 4774042
 25 GUAM-B 170 190 20 15 3160000
 16 GUAM-A 173 187 14 15 1056014
 17 INDI-A 179 195 16 15 9757024
 27 POGO-C 180 185 5 15 6392000
 23 BOSS-A 190 200 10 15 0712000
 18 REEF-A 193 207 14 15 1132085
 26 GUAM-A 202 227 25 15 6142000
 29 HULA-B 205 220 15 15 7225000
 19 POGO-A 217 233 16 15 9845009
 28 REEF-A 222 242 20 15 5329000
 20 LION-A 225 239 14 15 6553055
 21 POGO-B 226 242 16 15 3187074
 33 INDI-A 230 245 15 15 4524000
 22 POGO-C 234 248 14 15 6553055
 34 BOSS-A 235 280 45 15 3726000
 23 PIKE-A 238 253 15 15 7050006
 24 HULA-A 238 254 16 15 0286045
 35 COOK-A 240 255 15 15 1920000
 25 LION-B 244 257 13 15 1056014
 36 GUAM-A 265 285 20 15 5775000
 37 GUAM-B 265 745 480 15 3726000
 32 PIKE-A 268 273 5 15 6451000
 27 POGO-A 268 279 11 15 4774042
 31 HULA-A 269 284 15 15 9441000
 28 LION-A 271 284 13 15 1132085

38 LION-B 290 310 20 15 2124000
 39 INDI-A 290 300 10 15 6280000
 40 POGO-A 294 304 10 15 7506000
 41 COOK-B 300 345 45 15 3028000
 29 LION-A 325 336 11 15 6553055
 30 POGO-A 326 342 16 15 3187074
 43 INDI-A 330 350 20 15 3160000
 44 LION-B 330 335 5 15 4845000
 31 POGO-B 331 345 14 15 6553055
 32 HULA-A 335 351 16 15 9757024
 33 HULA-B 335 351 16 15 9757024
 34 BOSS-A 340 355 15 15 1056014
 35 COOK-A 349 364 15 15 1132085
 47 POGO-C 350 360 10 15 7225000
 36 GUAM-A 355 369 14 15 6553055
 48 PIKE-A 358 415 57 15 6071000
 49 LION-B 360 375 15 15 3055000
 37 POGO-A 364 376 12 15 0286045
 38 LION-A 365 381 16 15 9757024
 45 HULA-A 366 391 25 15 9445000
 46 HULA-B 366 371 5 15 7314000
 39 POGO-B 367 379 12 15 4774042
 50 POGO-B 394 409 15 15 4373000
 51 POGO-C 395 410 15 15 7304000
 40 HULA-A 413 430 17 15 2532097
 53 LION-A 420 435 15 15 5775000
 54 GUAM-A 420 435 15 15 2272000
 41 BOSS-A 421 434 13 15 6553055
 55 INDI-A 425 515 90 15 6391000
 42 POGO-A 426 443 17 15 3187074
 43 PIKE-A 440 454 14 15 1056014
 44 COOK-A 441 452 11 15 7050006
 52 HULA-A 445 455 10 15 7310000
 45 POGO-B 449 466 17 15 1056014
 46 LION-A 466 482 16 15 9757024
 47 POGO-A 466 480 14 15 0286045
 56 COOK-A 475 520 45 15 2567000
 48 BOSS-A 475 487 12 15 4774042
 49 REEF-A 480 496 16 15 1056014
 57 GUAM-A 490 510 20 15 5775000
 58 LION-B 505 515 10 15 7225000
 59 HULA-B 510 530 20 15 5953000
 60 LION-A 515 535 20 15 5329000
 61 COOK-B 515 525 10 15 6394000
 50 HULA-A 515 527 12 15 2532097
 62 BOSS-B 525 530 5 15 0712000
 63 BOSS-A 525 535 10 15 9364000
 51 POGO-C 527 543 16 15 3187074
 64 INDI-A 530 545 15 15 6374000
 52 GUAM-A 535 550 15 15 9757024
 53 PIKE-A 539 556 17 15 1056014
 65 LION-B 540 550 10 15 4832000
 66 COOK-A 545 570 25 15 6012000

54 POGO-A 551 567 16 15 1056014
 55 HULA-A 551 561 10 15 6790043
 56 POGO-B 559 575 16 15 9757024
 67 BOSS-A 560 570 10 15 4035000
 68 HULA-B 560 575 15 15 7304000
 57 POGO-C 567 583 16 15 0286045
 69 LION-A 570 590 20 15 2124000
 70 INDI-A 570 585 15 15 9446000
 58 BOSS-B 571 586 15 15 4774042
 59 REEF-A 582 596 14 15 1056014
 72 HULA-A 590 600 10 15 9363000
 73 HULA-B 590 595 5 15 6453000
 74 LION-B 600 605 5 15 9366000
 71 BOSS-B 601 641 40 15 8896000
 75 POGO-C 605 615 10 15 7304000
 60 PIKE-A 614 629 15 15 6553055
 61 BOSS-A 619 635 16 15 3187074
 62 POGO-A 625 639 14 15 6553055
 63 REEF-A 632 644 12 15 4774042
 64 GUAM-A 636 651 15 15 9757024
 65 POGO-B 638 651 13 15 2532097
 66 POGO-C 653 669 16 15 1056014
 76 LION-B 660 670 10 15 5037000
 77 HULA-A 660 675 15 15 6451000
 78 COOK-B 660 705 45 15 2524000
 67 POGO-A 660 674 14 15 4774042
 68 LION-A 665 678 13 15 1056014
 69 BOSS-B 668 683 15 15 1132085
 71 BOSS-A 670 686 16 15 9757024
 79 POGO-C 684 699 15 15 9783000
 80 INDI-A 690 710 20 15 5775000
 82 POGO-A 690 700 10 15 7304000
 83 POGO-B 690 725 35 15 6012000
 81 BOSS-A 701 711 10 15 4524000
 84 LION-A 701 711 10 15 4845000
 87 POGO-B 725 735 10 15 7310000
 72 REEF-A 728 742 14 15 4774042
 88 COOK-B 730 925 195 15 3726000
 89 COOK-A 735 765 30 15 9364000
 73 HULA-A 736 752 16 15 1056014
 74 HULA-B 736 752 16 15 1056014
 75 POGO-A 739 753 14 15 2532097
 76 POGO-B 756 772 16 15 1056014
 77 POGO-C 757 771 14 15 4774042
 86 HULA-A 767 772 5 15 6071000
 91 HULA-B 767 772 5 15 7314000
 78 BOSS-A 769 783 14 15 1132085
 79 BOSS-B 771 786 15 15 9757024
 92 INDI-A 780 785 5 15 6391000
 90 BOSS-A 798 818 20 15 2124000
 93 INDI-A 800 810 10 15 4955000
 95 POGO-C 800 835 35 15 7837000
 94 BOSS-B 801 811 10 15 4035000

80 HULA-A 807 820 13 15 6553055
 81 HULA-B 807 820 13 15 6553055
 96 GUAM-B 810 825 15 15 9443000
 97 COOK-A 825 840 15 15 8275000
 98 INDI-A 830 850 20 15 5775000
 82 REEF-A 831 847 16 15 9757024
 83 POGO-B 834 848 14 15 3187074
 84 LION-B 845 857 12 15 4774042
 85 BOSS-A 848 863 15 15 2532097
 86 POGO-A 854 868 14 15 4774042
 101 POGO-C 855 900 45 15 5681000
 102 HULA-A 860 875 15 15 7506000
 99 POGO-B 863 878 15 15 3310000
 103 INDI-A 865 900 35 15 9444000
 87 LION-A 867 882 15 15 1056014
 104 GUAM-A 870 890 20 15 3160000
 106 REEF-A 870 890 20 15 7310000
 88 COOK-A 874 890 16 15 9757024
 100 BOSS-A 878 883 5 15 9366000
 105 BOSS-A 898 908 10 15 5037000
 89 HULA-A 904 917 13 15 6553055
 108 COOK-A 905 920 15 15 3028000
 90 LION-A 907 922 15 15 7050007
 109 POGO-B 910 955 45 15 3726000
 107 INDI-A 915 920 5 15 6280000
 110 POGO-C 915 960 45 15 3310000
 111 HULA-A 932 947 15 15 7225000
 91 LION-B 933 947 14 15 6553055
 92 REEF-A 933 946 13 15 9757024
 93 GUAM-A 935 951 16 15 1056014
 94 POGO-A 939 950 11 15 3187074
 112 REEF-A 961 981 20 15 5329000
 113 POGO-B 970 980 10 15 6392000
 96 BOSS-A 970 983 13 15 1056014
 97 HULA-A 970 981 11 15 4774042
 98 HULA-B 970 981 11 15 4774042
 99 POGO-A 971 987 16 15 0286045
 114 POGO-C 975 990 15 15 5681000
 100 COOK-A 975 989 14 15 9757024
 115 INDI-A 990 995 5 15 9446000
 116 LION-A 990 1010 20 15 5775000
 117 COOK-A 1005 1025 20 15 5953000
 120 HULA-B 1005 1050 45 15 4373000
 119 COOK-B 1010 1015 5 15 6453000
 121 POGO-B 1010 1020 10 15 7506000
 101 LION-B 1010 1025 15 15 7050007
 122 BOSS-B 1020 1040 20 15 2124000
 123 PIKE-A 1020 1035 15 15 6738000
 102 HULA-A 1020 1036 16 15 3187074
 103 POGO-A 1024 1036 12 15 6553055
 104 INDI-A 1025 1039 14 15 1132085
 105 GUAM-B 1039 1050 11 15 1056014
 106 LION-A 1039 1052 13 15 4774042

125 BOSS-A 1040 1050 10 15 4035000
 107 POGO-C 1047 1061 14 15 4774042
 124 HULA-A 1051 1056 5 15 6394000
 108 LION-B 1052 1063 11 15 9757024
 126 INDI-A 1054 1059 5 15 4845000
 109 POGO-B 1062 1074 12 15 9757024
 110 BOSS-A 1070 1086 16 15 1056014
 111 POGO-A 1071 1087 16 15 0286045
 127 POGO-C 1076 1086 10 15 7225000
 112 HULA-A 1079 1095 16 15 9757024
 113 HULA-B 1079 1095 16 15 9757024
 128 LION-A 1080 1100 20 15 5329000
 129 COOK-A 1080 1095 15 15 9364000
 131 POGO-B 1089 1104 15 15 2524000
 114 GUAM-A 1098 1112 14 15 6553055
 115 BOSS-B 1099 1114 15 15 7050007
 132 INDI-A 1105 1205 100 15 5775000
 133 GUAM-B 1105 1150 45 15 8896000
 130 COOK-A 1110 1130 20 15 7641000
 135 HULA-B 1110 1120 10 15 9443000
 136 POGO-C 1110 1125 15 15 9434000
 137 HULA-A 1115 1130 15 15 7304000
 116 POGO-A 1123 1136 13 15 6553055
 138 BOSS-B 1129 1134 5 15 4524000
 117 LION-B 1129 1138 9 15 6553055
 118 BOSS-A 1138 1149 11 15 4774042
 140 REEF-A 1140 1150 10 15 7310000
 141 HULA-B 1140 1155 15 15 2941000
 119 POGO-B 1145 1158 13 15 3187074
 120 LION-A 1150 1166 16 15 9757024
 121 POGO-A 1161 1174 13 15 9757024
 134 BOSS-A 1164 1174 10 15 5037000
 122 GUAM-A 1168 1181 13 15 4774042
 123 HULA-A 1169 1181 12 15 1132085
 124 POGO-C 1171 1188 17 15 0286045
 125 PIKE-A 1172 1188 16 15 1056014
 143 POGO-B 1173 1183 10 15 7506000
 139 LION-A 1181 1191 10 15 6391000
 144 GUAM-B 1185 1192 7 15 7304000
 145 HULA-B 1190 1205 15 15 7314000
 126 COOK-A 1192 1206 14 15 7050007
 142 HULA-A 1196 1201 5 15 6451000
 146 COOK-B 1200 1245 45 15 0470000
 147 LION-A 1210 1220 10 15 4832000
 148 BOSS-B 1215 1220 5 15 9366000
 127 POGO-B 1221 1235 14 15 6553055
 128 HULA-A 1222 1234 12 15 6790043
 129 REEF-A 1231 1248 17 15 1056014
 130 BOSS-A 1232 1247 15 15 4774042
 149 INDI-A 1245 1270 25 15 9444000
 131 POGO-A 1247 1262 15 15 3187074
 132 LION-A 1252 1267 15 15 9757024
 133 HULA-A 1257 1268 11 15 2532097

151 GUAM-B 1260 1285 25 15 7304000
 134 POGO-B 1260 1274 14 15 9757024
 135 BOSS-B 1264 1280 16 15 0286045
 152 POGO-C 1265 1290 25 15 6012000
 136 COOK-A 1274 1290 16 15 1056014
 153 BOSS-A 1280 1290 10 15 4035000
 137 GUAM-A 1283 1299 16 15 9757024
 150 INDI-A 1285 1305 20 15 3160000
 154 LION-B 1290 1305 15 15 0712000
 155 HULA-B 1290 1330 40 15 8896000
 156 LION-A 1290 1305 15 15 9794000
 138 COOK-B 1293 1308 15 15 7050007
 139 POGO-A 1318 1333 15 15 6553055
 157 GUAM-B 1320 1485 165 15 3726000
 158 HULA-A 1320 1330 10 15 7304000
 140 BOSS-A 1327 1340 13 15 6553055
 141 INDI-A 1333 1349 16 15 1056014
 142 POGO-B 1335 1351 16 15 2532097
 159 HULA-A 1345 1355 10 15 6071000

143 POGO-C 1349 1365 16 15 3187074
 144 BOSS-B 1352 1364 12 15 9757024
 161 LION-A 1355 1390 35 15 5329000
 162 HULA-B 1355 1368 13 15 6012000
 145 POGO-A 1359 1375 16 15 9757024
 147 GUAM-A 1366 1380 14 15 1132085
 148 BOSS-A 1366 1380 14 15 0286045
 149 REEF-A 1370 1384 14 15 4774043
 163 BOSS-B 1380 1385 5 15 8275000
 164 BOSS-A 1380 1400 20 15 2124000
 150 INDI-A 1389 1401 12 15 6553055
 160 GUAM-A 1395 1415 20 15 3160000
 166 LION-A 1405 1415 10 15 4845000
 168 LION-B 1415 1435 20 15 5037000
 169 POGO-A 1415 1450 35 15 6012000
 167 INDI-A 1416 1436 20 15 5775000
 151 COOK-B 1426 1441 15 15 4774043
 152 COOK-A 1428 1443 15 15 6553055
 153 BOSS-A 1428 1442 14 15 2532097

UTIL.PAS RTS Utility. After the final 24 hour schedule has been determined,
 this program can be used to sort the supports by RTS and time. At the end of each RTS
 group the RTS utility is given.

program DIVIDE;

Type

mat = array[1..40, 1..3] of Integer;

Var

I,j,N,cnt,bv,ev,ailen,req,snumlf,snumbf,irevlf,irevhf,aiday : Integer;
 snumdd,times,durlen,schr,scmin,sctot,sitme,dln,tatn : integer;
 bt,et,du,etl,bt1,du1,bthln,ethln,hfnln,durln : integer;
 bthn,bttn,etmn,ethn,adn,ahn,aminn,addn,adh,adminn,time,time1,etime,
 etime1,dhln,dminln,vis,tol,durn,e,e1,hfnn : integer;
 error,aihr,sihr,aitmehr,aitmemin,irev,aimin,diff,silen,stm,sum : integer;
 lfident,hfident,smon,stme,amon,atme,alen,chk,ident1,amon1,
 atme1,bth1,eth1,hfn1,durl : string[4];
 slen,gts2,gts1,slen1 : string[6];
 bth,eth,hfn,phfn,dur,num,ident : string[5];
 rev1 : string[7];
 tat,rev : string[3];
 id,id1,sch,line,sp,s1,s2,s3,s4,s11,s21,s31,s41,sch1,h11,h1 : STRING[1];
 scnt,sbv,sev,sailen,nsctot,bth2,eth2 : string[4];
 aday,ahr,atmehr,atmemin,d2,aday1,tat1,ahr1 : string[2];
 atmehr1,atmemin1,d11,d21,m1,d1,h1,min1,dd1,dh1,dmin1,m,d,h,min,dd,dh,dmin,
 am,ad,ah,amin,add,adh,admin,am1,ad1,ah1,amin1,add1,adh1,admin1 : string[2];
 last : string[3];
 fill : string[40];
 fill1 : string[19];
 revv,revlf,revhf,util : real;

```

dum:STRING[9];
Infile,Infile1,OutFile1,outfile2,outfile3,outfile4,outfile : Text;
stats : mat;
Match :boolean;

```

```

Begin {Main Program}

```

```

    phfn:=' 0';
    sp:=' ';
    chk:='  ';
    cnt:=1;
    snumlf:=1;
    snumhf:=300;
    irevlf:=0;
    irevhf:=9999;
    lfident:='  ';
    hfident:='  ';
    Writeln('Begin Reading Fin.dft');
    Assign(Infile1,'c:\fs13.dat');
    Reset(Infile1);

```

```

    Assign(Outfile1,'C:\fss13.dat');
    Rewrite(Outfile1);

```

```

    sum:=0;
    Writeln('Reading Data');
    repeat

```

```

        readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

```

```

        if gts2='POGO-A' then
        begin
            if rev<>'000' then tat:=' 20';
            val(tat,tatn,error);
            val(dur,durn,error);
            sum:=sum+durn+tatn;
            writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
            end;
            until eof(infile1);
            util:=sum/1440;
            writeln(outfile1,sum:5,' ',util);
            sum:=0;
            reset(infile1);
            repeat

```

```

                readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

```

```

                if gts2='POGO-B' then
                begin
                    if rev<>'000' then tat:=' 20';
                    val(tat,tatn,error);
                    val(dur,durn,error);
                    sum:=sum+durn+tatn;

```

```

writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
end;
until eof(infile1);
util:=sum/1440;
writeln(outfile1,sum:5,' ',util);
sum:=0;
reset(infile1);
repeat

```

```

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

```

```

if gts2='POGO-C' then
begin
if rev<>'000' then tat:=' 20';
val(tat,tatn,error);
val(dur,durn,error);
sum:=sum+durn+tatn;
writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
end;
until eof(infile1);
util:=sum/1440;
writeln(outfile1,sum:5,' ',util);
sum:=0;
reset(infile1);
repeat

```

```

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

```

```

if gts2='HULA-A' then
begin
if rev<>'000' then tat:=' 20';
val(tat,tatn,error);
val(dur,durn,error);
sum:=sum+durn+tatn;
writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
end;
until eof(infile1);
util:=sum/1440;
writeln(outfile1,sum:5,' ',util);
sum:=0;
reset(infile1);
repeat

```

```

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

```

```

if gts2='HULA-B' then
begin
if rev<>'000' then tat:=' 20';
val(tat,tatn,error);
val(dur,durn,error);
sum:=sum+durn+tatn;
writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);

```

```

end;
until eof(infile1);
util:=sum/1440;
writeln(outfile1,sum:5,' ',util);
sum:=0;
reset(infile1);
repeat

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

if gts2='COOK-A' then
begin
if rev<>'000' then tat:=' 20';
val(tat,tatn,error);
val(dur,durn,error);
sum:=sum+durn+tatn;
writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
end;
until eof(infile1);
util:=sum/1440;
writeln(outfile1,sum:5,' ',util);
sum:=0;
reset(infile1);
repeat

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

if gts2='COOK-B' then
begin
if rev<>'000' then tat:=' 20';
val(tat,tatn,error);
val(dur,durn,error);
sum:=sum+durn+tatn;
writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
end;
until eof(infile1);
util:=sum/1440;
writeln(outfile1,sum:5,' ',util);
sum:=0;
reset(infile1);
repeat

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

if gts2='INDI-A' then
begin
if rev<>'000' then tat:=' 20';
val(tat,tatn,error);
val(dur,durn,error);
sum:=sum+durn+tatn;
writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
end;
until eof(infile1);

```

```

        util:=sum/1440;
        writeln(outfile1,sum:5,' ',util);
        sum:=0;
        reset(infile1);
        repeat
readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);
        if gts2='BOSS-A' then
        begin
        if rev<>'000' then tat:=' 20';
            val(tat,tatn,error);
            val(dur,durn,error);
            sum:=sum+durn+tatn;
            writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
            end;
            until eof(infile1);
            util:=sum/1440;
            writeln(outfile1,sum:5,' ',util);
            sum:=0;
            reset(infile1);
            repeat

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

        if gts2='BOSS-B' then
        begin
        if rev<>'000' then tat:=' 20';
            val(tat,tatn,error);
            val(dur,durn,error);
            sum:=sum+durn+tatn;
            writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
            end;
            until eof(infile1);
            util:=sum/1440;
            writeln(outfile1,sum:5,' ',util);
            sum:=0;
            reset(infile1);
            repeat

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

        if gts2='LION-A' then
        begin
        if rev<>'000' then tat:=' 20';
            val(tat,tatn,error);
            val(dur,durn,error);
            sum:=sum+durn+tatn;
            writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
            end;
            until eof(infile1);
            util:=sum/1440;
            writeln(outfile1,sum:5,' ',util);
            sum:=0;
            reset(infile1);

```

```

repeat

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

if gts2='LION-B' then
begin
if rev<>'000' then tat:=' 20';
val(tat,tatn,error);
val(dur,durn,error);
sum:=sum+durn+tatn;
writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
end;
until eof(infile1);
util:=sum/1440;
writeln(outfile1,sum:5,' ',util);
sum:=0;
reset(infile1);
repeat

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

if gts2='GUAM-A' then
begin
if rev<>'000' then tat:=' 20';
val(tat,tatn,error);
val(dur,durn,error);
sum:=sum+durn+tatn;
writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
end;
until eof(infile1);
util:=sum/1440;
writeln(outfile1,sum:5,' ',util);
sum:=0;
reset(infile1);
repeat

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

if gts2='GUAM-B' then
begin
if rev<>'000' then tat:=' 20';
val(tat,tatn,error);
val(dur,durn,error);
sum:=sum+durn+tatn;
writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
end;
until eof(infile1);
util:=sum/1440;
writeln(outfile1,sum:5,' ',util);
sum:=0;
reset(infile1);
repeat

```

```

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

if gts2='PIKE-A' then
begin
if rev<>'000' then tat:=' 20';
  val(tat,tatn,error);
  val(dur,durn,error);
  sum:=sum+durn+tatn;
  writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
  end;
  until eof(infile1);
  util:=sum/1440;
  writeln(outfile1,sum:5,' ',util);
  sum:=0;
  reset(infile1);
  repeat

readln(infile1,num,gts2,bth,eth,dur,tat,ident,rev);

if gts2='REEF-A' then
begin
if rev<>'000' then tat:=' 20';
  val(tat,tatn,error);
  val(dur,durn,error);
  sum:=sum+durn+tatn;
  writeln(outfile1,num,gts2,bth,eth,dur,tat,ident,rev);
  end;
  until eof(infile1);
  util:=sum/1440;
  writeln(outfile1,sum:5,' ',util);
  sum:=0;
  reset(outfile1);
  repeat
  readln(outfile1);
  until eof(outfile1);
end.*

```

UTIL.PAS Output (Sorted Final 24 Hour Schedule).

2 POGO-A 26 42 16 20 2532097	67 POGO-A 660 674 14 20 4774042
9 POGO-A 57 72 15 15 0470000	82 POGO-A 690 700 10 15 7304000
14 POGO-A 87 102 15 15 9521000	75 POGO-A 739 753 14 20 2532097
15 POGO-A 169 179 10 20 4774042	86 POGO-A 854 868 14 20 4774042
19 POGO-A 217 233 16 20 9845009	94 POGO-A 939 950 11 20 3187074
27 POGO-A 268 279 11 20 4774042	99 POGO-A 971 987 16 20 0286045
40 POGO-A 294 304 10 15 7506000	103 POGO-A 1024 1036 12 20 6553055
30 POGO-A 326 342 16 20 3187074	111 POGO-A 1071 1087 16 20 0286045
37 POGO-A 364 376 12 20 0286045	116 POGO-A 1123 1136 13 20 6553055
42 POGO-A 426 443 17 20 3187074	121 POGO-A 1161 1174 13 20 9757024
47 POGO-A 466 480 14 20 0286045	131 POGO-A 1247 1262 15 20 3187074
54 POGO-A 551 567 16 20 1056014	139 POGO-A 1318 1333 15 20 6553055
62 POGO-A 625 639 14 20 6553055	145 POGO-A 1359 1375 16 20 9757024

169 POGO-A 1415 1450 35 15 6012000
 911 6.3263888889E-01
 5 POGO-B 5 15 10 15 7310000
 4 POGO-B 51 64 13 20 1056014
 10 POGO-B 138 152 14 20 6553055
 22 POGO-B 167 187 20 15 7310000
 21 POGO-B 226 242 16 20 3187074
 31 POGO-B 331 345 14 20 6553055
 39 POGO-B 367 379 12 20 4774042
 50 POGO-B 394 409 15 15 4373000
 45 POGO-B 449 466 17 20 1056014
 56 POGO-B 559 575 16 20 9757024
 65 POGO-B 638 651 13 20 2532097
 83 POGO-B 690 725 35 15 6012000
 87 POGO-B 725 735 10 15 7310000
 76 POGO-B 756 772 16 20 1056014
 83 POGO-B 834 848 14 20 3187074
 99 POGO-B 863 878 15 15 3310000
 109 POGO-B 910 955 45 15 3726000
 113 POGO-B 970 980 10 15 6392000
 121 POGO-B 1010 1020 10 15 7506000
 109 POGO-B 1062 1074 12 20 9757024
 131 POGO-B 1089 1104 15 15 2524000
 119 POGO-B 1145 1158 13 20 3187074
 143 POGO-B 1173 1183 10 15 7506000
 127 POGO-B 1221 1235 14 20 6553055
 134 POGO-B 1260 1274 14 20 9757024
 142 POGO-B 1335 1351 16 20 2532097
 874 6.0694444444E-01
 7 POGO-C 30 75 45 15 8639000
 17 POGO-C 90 100 10 15 9442000
 13 POGO-C 150 163 13 20 1056014
 27 POGO-C 180 185 5 15 6392000
 22 POGO-C 234 248 14 20 6553055
 47 POGO-C 350 360 10 15 7225000
 51 POGO-C 395 410 15 15 7304000
 51 POGO-C 527 543 16 20 3187074
 57 POGO-C 567 583 16 20 0286045
 75 POGO-C 605 615 10 15 7304000
 66 POGO-C 653 669 16 20 1056014
 79 POGO-C 684 699 15 15 9783000
 77 POGO-C 757 771 14 20 4774042
 95 POGO-C 800 835 35 15 7837000
 101 POGO-C 855 900 45 15 5681000
 110 POGO-C 915 960 45 15 3310000
 114 POGO-C 975 990 15 15 5681000
 107 POGO-C 1047 1061 14 20 4774042
 127 POGO-C 1076 1086 10 15 7225000
 136 POGO-C 1110 1125 15 15 9434000
 124 POGO-C 1171 1188 17 20 0286045
 152 POGO-C 1265 1290 25 15 6012000
 143 POGO-C 1349 1365 16 20 3187074
 826 5.7361111111E-01

1 HULA-A 0 35 35 15 9445000
 16 HULA-A 90 105 15 15 6453000
 12 HULA-A 139 153 14 20 0286045
 24 HULA-A 238 254 16 20 0286045
 31 HULA-A 269 284 15 15 9441000
 32 HULA-A 335 351 16 20 9757024
 45 HULA-A 366 391 25 15 9445000
 40 HULA-A 413 430 17 20 2532097
 52 HULA-A 445 455 10 15 7310000
 50 HULA-A 515 527 12 20 2532097
 55 HULA-A 551 561 10 20 6790043
 72 HULA-A 590 600 10 15 9363000
 77 HULA-A 660 675 15 15 6451000
 73 HULA-A 736 752 16 20 1056014
 86 HULA-A 767 772 5 15 6071000
 80 HULA-A 807 820 13 20 6553055
 102 HULA-A 860 875 15 15 7506000
 89 HULA-A 904 917 13 20 6553055
 111 HULA-A 932 947 15 15 7225000
 97 HULA-A 970 981 11 20 4774042
 102 HULA-A 1020 1036 16 20 3187074
 124 HULA-A 1051 1056 5 15 6394000
 112 HULA-A 1079 1095 16 20 9757024
 137 HULA-A 1115 1130 15 15 7304000
 123 HULA-A 1169 1181 12 20 1132085
 142 HULA-A 1196 1201 5 15 6451000
 128 HULA-A 1222 1234 12 20 6790043
 133 HULA-A 1257 1268 11 20 2532097
 158 HULA-A 1320 1330 10 15 7304000
 159 HULA-A 1345 1355 10 15 6071000
 935 6.4930555556E-01
 8 HULA-B 30 50 20 15 5953000
 29 HULA-B 205 220 15 15 7225000
 33 HULA-B 335 351 16 20 9757024
 46 HULA-B 366 371 5 15 7314000
 59 HULA-B 510 530 20 15 5953000
 68 HULA-B 560 575 15 15 7304000
 73 HULA-B 590 595 5 15 6453000
 74 HULA-B 736 752 16 20 1056014
 91 HULA-B 767 772 5 15 7314000
 81 HULA-B 807 820 13 20 6553055
 98 HULA-B 970 981 11 20 4774042
 120 HULA-B 1005 1050 45 15 4373000
 113 HULA-B 1079 1095 16 20 9757024
 135 HULA-B 1110 1120 10 15 9443000
 141 HULA-B 1140 1155 15 15 2941000
 145 HULA-B 1190 1205 15 15 7314000
 155 HULA-B 1290 1330 40 15 8896000
 162 HULA-B 1355 1368 13 15 6012000
 590 4.0972222222E-01
 3 COOK-A 0 5 5 15 8275000
 5 COOK-A 54 67 13 20 4774042
 21 COOK-A 145 160 15 15 7506000

35 COOK-A 240 255 15 15 1920000
 35 COOK-A 349 364 15 20 1132085
 44 COOK-A 441 452 11 20 7050006
 56 COOK-A 475 520 45 15 2567000
 66 COOK-A 545 570 25 15 6012000
 89 COOK-A 735 765 30 15 9364000
 97 COOK-A 825 840 15 15 8275000
 88 COOK-A 874 890 16 20 9757024
 108 COOK-A 905 920 15 15 3028000
 100 COOK-A 975 989 14 20 9757024
 117 COOK-A 1005 1025 20 15 5953000
 129 COOK-A 1080 1095 15 15 9364000
 130 COOK-A 1110 1130 20 15 7641000
 126 COOK-A 1192 1206 14 20 7050007
 136 COOK-A 1274 1290 16 20 1056014
 152 COOK-A 1428 1443 15 20 6553055
 659 4.5763888889E-01
 6 COOK-B 54 68 14 20 6553055
 41 COOK-B 300 345 45 15 3028000
 61 COOK-B 515 525 10 15 6394000
 78 COOK-B 660 705 45 15 2524000
 88 COOK-B 730 925 195 15 3726000
 119 COOK-B 1010 1015 5 15 6453000
 146 COOK-B 1200 1245 45 15 0470000
 138 COOK-B 1293 1308 15 20 7050007
 151 COOK-B 1426 1441 15 20 4774043
 539 3.7430555556E-01
 1 INDI-A 13 28 15 20 6553055
 11 INDI-A 54 64 10 15 4955000
 18 INDI-A 90 110 20 15 5775000
 17 INDI-A 179 195 16 20 9757024
 33 INDI-A 230 245 15 15 4524000
 39 INDI-A 290 300 10 15 6280000
 43 INDI-A 330 350 20 15 3160000
 55 INDI-A 425 515 90 15 6391000
 64 INDI-A 530 545 15 15 6374000
 70 INDI-A 570 585 15 15 9446000
 80 INDI-A 690 710 20 15 5775000
 92 INDI-A 780 785 5 15 6391000
 93 INDI-A 800 810 10 15 4955000
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 103 INDI-A 865 900 35 15 9444000
 107 INDI-A 915 920 5 15 6280000
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 104 INDI-A 1025 1039 14 20 1132085
 126 INDI-A 1054 1059 5 15 4845000
 132 INDI-A 1105 1205 100 15 5775000
 149 INDI-A 1245 1270 25 15 9444000
 150 INDI-A 1285 1305 20 15 3160000
 141 INDI-A 1333 1349 16 20 1056014
 150 INDI-A 1389 1401 12 20 6553055
 167 INDI-A 1416 1436 20 15 5775000
 938 6.5138888889E-01

4 BOSS-A 0 5 5 15 6280000
 3 BOSS-A 39 55 16 20 9757024
 9 BOSS-A 117 133 16 20 2532097
 14 BOSS-A 163 175 12 20 5821064
 23 BOSS-A 190 200 10 15 0712000
 34 BOSS-A 235 280 45 15 3726000
 34 BOSS-A 340 355 15 20 1056014
 41 BOSS-A 421 434 13 20 6553055
 48 BOSS-A 475 487 12 20 4774042
 63 BOSS-A 525 535 10 15 9364000
 67 BOSS-A 560 570 10 15 4035000
 61 BOSS-A 619 635 16 20 3187074
 71 BOSS-A 670 686 16 20 9757024
 81 BOSS-A 701 711 10 15 4524000
 78 BOSS-A 769 783 14 20 1132085
 90 BOSS-A 798 818 20 15 2124000
 85 BOSS-A 848 863 15 20 2532097
 100 BOSS-A 878 883 5 15 9366000
 105 BOSS-A 898 908 10 15 5037000
 96 BOSS-A 970 983 13 20 1056014
 125 BOSS-A 1040 1050 10 15 4035000
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 134 BOSS-A 1164 1174 10 15 5037000
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 153 BOSS-A 1280 1290 10 15 4035000
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 153 BOSS-A 1428 1442 14 20 2532097
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 62 BOSS-B 525 530 5 15 0712000
 58 BOSS-B 571 586 15 20 4774042
 71 BOSS-B 601 641 40 15 8896000
 69 BOSS-B 668 683 15 20 1132085
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 122 BOSS-B 1020 1040 20 15 2124000
 115 BOSS-B 1099 1114 15 20 7050007
 138 BOSS-B 1129 1134 5 15 4524000
 148 BOSS-B 1215 1220 5 15 9366000
 135 BOSS-B 1264 1280 16 20 0286045
 144 BOSS-B 1352 1364 12 20 9757024
 163 BOSS-B 1380 1385 5 15 8275000
 878 6.0972222222E-01
 2 LION-A 0 15 15 15 2567000
 13 LION-A 60 85 25 15 4035000
 20 LION-A 111 126 15 15 9366000
 24 LION-A 165 170 5 15 4035000
 20 LION-A 225 239 14 20 6553055
 28 LION-A 271 284 13 20 1132085

29 LION-A 325 336 11 20 6553055
 38 LION-A 365 381 16 20 9757024
 53 LION-A 420 435 15 15 5775000
 46 LION-A 466 482 16 20 9757024
 60 LION-A 515 535 20 15 5329000
 69 LION-A 570 590 20 15 2124000
 68 LION-A 665 678 13 20 1056014
 84 LION-A 701 711 10 15 4845000
 87 LION-A 867 882 15 20 1056014
 90 LION-A 907 922 15 20 7050007
 116 LION-A 990 1010 20 15 5775000
 106 LION-A 1039 1052 13 20 4774042
 128 LION-A 1080 1100 20 15 5329000
 120 LION-A 1150 1166 16 20 9757024
 139 LION-A 1181 1191 10 15 6391000
 147 LION-A 1210 220 10 15 4832000
 132 LION-A 1252 1267 15 20 9757024
 156 LION-A 1290 1305 15 15 9794000
 161 LION-A 1355 1390 35 15 5329000
 166 LION-A 1405 1415 10 15 4845000
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 38 LION-B 290 310 20 15 2124000
 44 LION-B 330 335 5 15 4845000
 49 LION-B 360 375 15 15 3055000
 58 LION-B 505 515 10 15 7225000
 65 LION-B 540 550 10 15 4832000
 74 LION-B 600 605 5 15 9366000
 76 LION-B 660 670 10 15 5037000
 84 LION-B 845 857 12 20 4774042
 91 LION-B 933 947 14 20 6553055
 101 LION-B 1010 1025 15 20 7050007
 108 LION-B 1052 1063 11 20 9757024
 117 LION-B 1129 1138 9 20 6553055
 154 LION-B 1290 1305 15 15 0712000
 168 LION-B 1415 1435 20 15 5037000
 469 3.2569444444E-01
 8 GUAM-A 108 123 15 20 7050006
 16 GUAM-A 173 187 14 20 1056014
 26 GUAM-A 202 227 25 15 6142000
 36 GUAM-A 265 285 20 15 5775000
 36 GUAM-A 355 369 14 20 6553055
 54 GUAM-A 420 435 15 15 2272000
 57 GUAM-A 490 510 20 15 5775000

52 GUAM-A 535 550 15 20 9757024
 64 GUAM-A 636 651 15 20 9757024
 104 GUAM-A 870 890 20 15 3160000
 93 GUAM-A 935 951 16 20 1056014
 114 GUAM-A 1098 1112 14 20 6553055
 122 GUAM-A 1168 1181 13 20 4774042
 137 GUAM-A 1283 1299 16 20 9757024
 147 GUAM-A 1366 1380 14 20 1132085
 160 GUAM-A 1395 1415 20 15 3160000
 556 3.8611111111E-01
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 25 GUAM-B 170 190 20 15 3160000
 37 GUAM-B 265 745 480 15 3726000
 96 GUAM-B 810 825 15 15 9443000
 105 GUAM-B 1039 1050 11 20 1056014
 133 GUAM-B 1105 1150 45 15 8896000
 144 GUAM-B 1185 1192 7 15 7304000
 151 GUAM-B 1260 1285 25 15 7304000
 157 GUAM-B 1320 1485 165 15 3726000
 943 6.5486111111E-01
 11 PIKE-A 138 154 16 20 9757024
 23 PIKE-A 238 253 15 20 7050006
 32 PIKE-A 268 273 5 15 6451000
 48 PIKE-A 358 415 57 15 6071000
 43 PIKE-A 440 454 14 20 1056014
 53 PIKE-A 539 556 17 20 1056014
 60 PIKE-A 614 629 15 20 6553055
 123 PIKE-A 1020 1035 15 15 6738000
 125 PIKE-A 1172 1188 16 20 1056014
 335 2.3263888889E-01
 7 REEF-A 81 93 12 20 9757024
 18 REEF-A 193 207 14 20 1132085
 28 REEF-A 222 242 20 15 5329000
 49 REEF-A 480 496 16 20 1056014
 59 REEF-A 582 596 14 20 1056014
 63 REEF-A 632 644 12 20 4774042
 72 REEF-A 728 742 14 20 4774042
 82 REEF-A 831 847 16 20 9757024
 106 REEF-A 870 890 20 15 7310000
 92 REEF-A 933 946 13 20 9757024
 112 REEF-A 961 981 20 15 5329000
 140 REEF-A 1140 1150 10 15 7310000
 129 REEF-A 1231 1248 17 20 1056014
 149 REEF-A 1370 1384 14 20 4774043
 472 3.2777777778E-01

APPENDIX B

Daily Schedules

24 hour schedules for first seven days of data. Output from UTIL.PAS.

DATA FORMAT

Arbitrary Support #-RTS side-start time-end time-duration-turn around time-IRON-partial REV

Day 1 Schedule.

2 POGO-A 26 42 16 20 2532097	87 POGO-B 725 735 10 15 7310000
9 POGO-A 57 72 15 15 0470000	76 POGO-B 756 772 16 20 1056014
14 POGO-A 87 102 15 15 9521000	83 POGO-B 834 848 14 20 3187074
15 POGO-A 169 179 10 20 4774042	99 POGO-B 863 878 15 15 3310000
19 POGO-A 217 233 16 20 9845009	109 POGO-B 910 955 45 15 3726000
27 POGO-A 268 279 11 20 4774042	113 POGO-B 970 980 10 15 6392000
40 POGO-A 294 304 10 15 7506000	121 POGO-B 1010 1020 10 15 7506000
30 POGO-A 326 342 16 20 3187074	109 POGO-B 1062 1074 12 20 9757024
37 POGO-A 364 376 12 20 0286045	131 POGO-B 1089 1104 15 15 2524000
42 POGO-A 426 443 17 20 3187074	119 POGO-B 1145 1158 13 20 3187074
47 POGO-A 466 480 14 20 0286045	143 POGO-B 1173 1183 10 15 7506000
54 POGO-A 551 567 16 20 1056014	127 POGO-B 1221 1235 14 20 6553055
62 POGO-A 625 639 14 20 6553055	134 POGO-B 1260 1274 14 20 9757024
67 POGO-A 660 674 14 20 4774042	142 POGO-B 1335 1351 16 20 2532097
82 POGO-A 690 700 10 15 7304000	874 6.069444444444E-01
75 POGO-A 739 753 14 20 2532097	7 POGO-C 30 75 45 15 8639000
86 POGO-A 854 868 14 20 4774042	17 POGO-C 90 100 10 15 9442000
94 POGO-A 939 950 11 20 3187074	13 POGO-C 150 163 13 20 1056014
99 POGO-A 971 987 16 20 0286045	27 POGO-C 180 185 5 15 6392000
103 POGO-A 1024 1036 12 20 6553055	22 POGO-C 234 248 14 20 6553055
111 POGO-A 1071 1087 16 20 0286045	47 POGO-C 350 360 10 15 7225000
116 POGO-A 1123 1136 13 20 6553055	51 POGO-C 395 410 15 15 7304000
121 POGO-A 1161 1174 13 20 9757024	51 POGO-C 527 543 16 20 3187074
131 POGO-A 1247 1262 15 20 3187074	57 POGO-C 567 583 16 20 0286045
139 POGO-A 1318 1333 15 20 6553055	75 POGO-C 605 615 10 15 7304000
145 POGO-A 1359 1375 16 20 9757024	66 POGO-C 653 669 16 20 1056014
169 POGO-A 1415 1450 35 15 6012000	79 POGO-C 684 699 15 15 9783000
911 6.32638888889E-01	77 POGO-C 757 771 14 20 4774042
5 POGO-B 5 15 10 15 7310000	95 POGO-C 800 835 35 15 7837000
4 POGO-B 51 64 13 20 1056014	101 POGO-C 855 900 45 15 5681000
10 POGO-B 138 152 14 20 6553055	110 POGO-C 915 960 45 15 3310000
22 POGO-B 167 187 20 15 7310000	114 POGO-C 975 990 15 15 5681000
21 POGO-B 226 242 16 20 3187074	107 POGO-C 1047 1061 14 20 4774042
31 POGO-B 331 345 14 20 6553055	127 POGO-C 1076 1086 10 15 7225000
39 POGO-B 367 379 12 20 4774042	136 POGO-C 1110 1125 15 15 9434000
50 POGO-B 394 409 15 15 4373000	124 POGO-C 1171 1188 17 20 0286045
45 POGO-B 449 466 17 20 1056014	152 POGO-C 1265 1290 25 15 6012000
56 POGO-B 559 575 16 20 9757024	143 POGO-C 1349 1365 16 20 3187074
65 POGO-B 638 651 13 20 2532097	826 5.736111111111E-01
83 POGO-B 690 725 35 15 6012000	1 HULA-A 0 35 35 15 9445000

16 HULA-A 90 105 15 15 6453000
 12 HULA-A 139 153 14 20 0286045
 24 HULA-A 238 254 16 20 0286045
 31 HULA-A 269 284 15 15 9441000
 32 HULA-A 335 351 16 20 9757024
 45 HULA-A 366 391 25 15 9445000
 40 HULA-A 413 430 17 20 2532097
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 72 HULA-A 590 600 10 15 9363000
 77 HULA-A 660 675 15 15 6451000
 73 HULA-A 736 752 16 20 1056014
 86 HULA-A 767 772 5 15 6071000
 80 HULA-A 807 820 13 20 6553055
 102 HULA-A 860 875 15 15 7506000
 89 HULA-A 904 917 13 20 6553055
 111 HULA-A 932 947 15 15 7225000
 97 HULA-A 970 981 11 20 4774042
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 112 HULA-A 1079 1095 16 20 9757024
 137 HULA-A 1115 1130 15 15 7304000
 123 HULA-A 1169 1181 12 20 1132085
 142 HULA-A 1196 1201 5 15 6451000
 128 HULA-A 1222 1234 12 20 6790043
 133 HULA-A 1257 1268 11 20 2532097
 158 HULA-A 1320 1330 10 15 7304000
 159 HULA-A 1345 1355 10 15 6071000
 935 6.4930555556E-01
 8 HULA-B 30 50 20 15 5953000
 29 HULA-B 205 220 15 15 7225000
 33 HULA-B 335 351 16 20 9757024
 46 HULA-B 366 371 5 15 7314000
 59 HULA-B 510 530 20 15 5953000
 68 HULA-B 560 575 15 15 7304000
 73 HULA-B 590 595 5 15 6453000
 74 HULA-B 736 752 16 20 1056014
 91 HULA-B 767 772 5 15 7314000
 81 HULA-B 807 820 13 20 6553055
 98 HULA-B 970 981 11 20 4774042
 120 HULA-B 1005 1050 45 15 4373000
 113 HULA-B 1079 1095 16 20 9757024
 135 HULA-B 1110 1120 10 15 9443000
 141 HULA-B 1140 1155 15 15 2941000
 145 HULA-B 1190 1205 15 15 7314000
 155 HULA-B 1290 1330 40 15 8896000
 162 HULA-B 1355 1368 13 15 6012000
 590 4.0972222222E-01
 3 COOK-A 0 5 5 15 8275000
 5 COOK-A 54 67 13 20 4774042
 21 COOK-A 145 160 15 15 7506000

35 COOK-A 240 255 15 15 1920000
 35 COOK-A 349 364 15 20 1132085
 44 COOK-A 441 452 11 20 7050006
 56 COOK-A 475 520 45 15 2567000
 66 COOK-A 545 570 25 15 6012000
 89 COOK-A 735 765 30 15 9364000
 97 COOK-A 825 840 15 15 8275000
 88 COOK-A 874 890 16 20 9757024
 108 COOK-A 905 920 15 15 3028000
 100 COOK-A 975 989 14 20 9757024
 117 COOK-A 1005 1025 20 15 5953000
 129 COOK-A 1080 1095 15 15 9364000
 130 COOK-A 1110 1130 20 15 7641000
 126 COOK-A 1192 1206 14 20 7050007
 136 COOK-A 1274 1290 16 20 1056014
 152 COOK-A 1428 1443 15 20 6553055
 659 4.5763888889E-01
 6 COOK-B 54 68 14 20 6553055
 41 COOK-B 300 345 45 15 3028000
 61 COOK-B 515 525 10 15 6394000
 78 COOK-B 660 705 45 15 2524000
 88 COOK-B 730 925 195 15 3726000
 119 COOK-B 1010 1015 5 15 6453000
 146 COOK-B 1200 1245 45 15 0470000
 138 COOK-B 1293 1308 15 20 7050007
 151 COOK-B 1426 1441 15 20 4774043
 539 3.7430555556E-01
 1 INDI-A 13 28 15 20 6553055
 11 INDI-A 54 64 10 15 4955000
 18 INDI-A 90 110 20 15 5775000
 17 INDI-A 179 195 16 20 9757024
 33 INDI-A 230 245 15 15 4524000
 39 INDI-A 290 300 10 15 6280000
 43 INDI-A 330 350 20 15 3160000
 55 INDI-A 425 515 90 15 6391000
 64 INDI-A 530 545 15 15 6374000
 70 INDI-A 570 585 15 15 9446000
 80 INDI-A 690 710 20 15 5775000
 92 INDI-A 780 785 5 15 6391000
 93 INDI-A 800 810 10 15 4955000
 98 INDI-A 830 850 20 15 5775000
 103 INDI-A 865 900 35 15 9444000
 107 INDI-A 915 920 5 15 6280000
 115 INDI-A 990 995 5 15 9446000
 104 INDI-A 1025 1039 14 20 1132085
 126 INDI-A 1054 1059 5 15 4845000
 132 INDI-A 1105 1205 100 15 5775000
 149 INDI-A 1245 1270 25 15 9444000
 150 INDI-A 1285 1305 20 15 3160000
 141 INDI-A 1333 1349 16 20 1056014
 150 INDI-A 1389 1401 12 20 6553055
 167 INDI-A 1416 1436 20 15 5775000

938 6.5138888889E-01

4 BOSS-A 0 5 5 15 6280000
3 BOSS-A 39 55 16 20 9757024
9 BOSS-A 117 133 16 20 2532097
14 BOSS-A 163 175 12 20 5821064
23 BOSS-A 190 200 10 15 0712000
34 BOSS-A 235 280 45 15 3726000
34 BOSS-A 340 355 15 20 1056014
41 BOSS-A 421 434 13 20 6553055
48 BOSS-A 475 487 12 20 4774042
63 BOSS-A 525 535 10 15 9364000
67 BOSS-A 560 570 10 15 4035000
61 BOSS-A 619 635 16 20 3187074
71 BOSS-A 670 686 16 20 9757024
81 BOSS-A 701 711 10 15 4524000
78 BOSS-A 769 783 14 20 1132085
90 BOSS-A 798 818 20 15 2124000
85 BOSS-A 848 863 15 20 2532097
100 BOSS-A 878 883 5 15 9366000
105 BOSS-A 898 908 10 15 5037000
96 BOSS-A 970 983 13 20 1056014
125 BOSS-A 1040 1050 10 15 4035000
110 BOSS-A 1070 1086 16 20 1056014
118 BOSS-A 1138 1149 11 20 4774042
134 BOSS-A 1164 1174 10 15 5037000
130 BOSS-A 1232 1247 15 20 4774042
153 BOSS-A 1280 1290 10 15 4035000
140 BOSS-A 1327 1340 13 20 6553055
148 BOSS-A 1366 1380 14 20 0286045
164 BOSS-A 1380 1400 20 15 2124000
153 BOSS-A 1428 1442 14 20 2532097

951 6.6041666667E-01

6 BOSS-B 10 20 10 15 6391000
10 BOSS-B 45 480 435 15 5037000
62 BOSS-B 525 530 5 15 0712000
58 BOSS-B 571 586 15 20 4774042
71 BOSS-B 601 641 40 15 8896000
69 BOSS-B 668 683 15 20 1132085
79 BOSS-B 771 786 15 20 9757024
94 BOSS-B 801 811 10 15 4035000
122 BOSS-B 1020 1040 20 15 2124000
115 BOSS-B 1099 1114 15 20 7050007
138 BOSS-B 1129 1134 5 15 4524000
148 BOSS-B 1215 1220 5 15 9366000
135 BOSS-B 1264 1280 16 20 0286045
144 BOSS-B 1352 1364 12 20 9757024
163 BOSS-B 1380 1385 5 15 8275000

878 6.0972222222E-01

2 LION-A 0 15 15 15 2567000
13 LION-A 60 85 25 15 4035000
20 LION-A 111 126 15 15 9366000
24 LION-A 165 170 5 15 4035000

20 LION-A 225 239 14 20 6553055
28 LION-A 271 284 13 20 1132085
29 LION-A 325 336 11 20 6553055
38 LION-A 365 381 16 20 9757024
53 LION-A 420 435 15 15 5775000
46 LION-A 466 482 16 20 9757024
60 LION-A 515 535 20 15 5329000
69 LION-A 570 590 20 15 2124000
68 LION-A 665 678 13 20 1056014
84 LION-A 701 711 10 15 4845000
87 LION-A 867 882 15 20 1056014
90 LION-A 907 922 15 20 7050007
116 LION-A 990 1010 20 15 5775000
106 LION-A 1039 1052 13 20 4774042
128 LION-A 1080 1100 20 15 5329000
120 LION-A 1150 1166 16 20 9757024
139 LION-A 1181 1191 10 15 6391000
147 LION-A 1210 1220 10 15 4832000
132 LION-A 1252 1267 15 20 9757024
156 LION-A 1290 1305 15 15 9794000
161 LION-A 1355 1390 35 15 5329000
166 LION-A 1405 1415 10 15 4845000
847 5.8819444444E-01

19 LION-B 105 120 15 15 8639000
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38 LION-B 290 310 20 15 2124000
44 LION-B 330 335 5 15 4845000
49 LION-B 360 375 15 15 3055000
58 LION-B 505 515 10 15 7225000
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74 LION-B 600 605 5 15 9366000
76 LION-B 660 670 10 15 5037000
84 LION-B 845 857 12 20 4774042
91 LION-B 933 947 14 20 6553055
101 LION-B 1010 1025 15 20 7050007
108 LION-B 1052 1063 11 20 9757024
117 LION-B 1129 1138 9 20 6553055
154 LION-B 1290 1305 15 15 0712000
168 LION-B 1415 1435 20 15 5037000
469 3.2569444444E-01

8 GUAM-A 108 123 15 20 7050006
16 GUAM-A 173 187 14 20 1056014
26 GUAM-A 202 227 25 15 6142000
36 GUAM-A 265 285 20 15 5775000
36 GUAM-A 355 369 14 20 6553055
54 GUAM-A 420 435 15 15 2272000
57 GUAM-A 490 510 20 15 5775000
52 GUAM-A 535 550 15 20 9757024
64 GUAM-A 636 651 15 20 9757024
104 GUAM-A 870 890 20 15 3160000
93 GUAM-A 935 951 16 20 1056014
114 GUAM-A 1098 1112 14 20 6553055

122 GUAM-A 1168 1181 13 20 4774042
 137 GUAM-A 1283 1299 16 20 9757024
 147 GUAM-A 1366 1380 14 20 1132085
 160 GUAM-A 1395 1415 20 15 3160000
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 25 GUAM-B 170 190 20 15 3160000
 37 GUAM-B 265 745 480 15 3726000
 96 GUAM-B 810 825 15 15 9443000
 105 GUAM-B 1039 1050 11 20 1056014
 133 GUAM-B 1105 1150 45 15 8896000
 144 GUAM-B 1185 1192 7 15 7304000
 151 GUAM-B 1260 1285 25 15 7304000
 157 GUAM-B 1320 1485 165 15 3726000
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 32 PIKE-A 268 273 5 15 6451000
 48 PIKE-A 358 415 57 15 6071000
 43 PIKE-A 440 454 14 20 1056014
 53 PIKE-A 539 556 17 20 1056014

60 PIKE-A 614 629 15 20 6553055
 123 PIKE-A 1020 1035 15 15 6738000
 125 PIKE-A 1172 1188 16 20 1056014
 335 2.3263888889E-01
 7 REEF-A 81 93 12 20 9757024
 18 REEF-A 193 207 14 20 1132085
 28 REEF-A 222 242 20 15 5329000
 49 REEF-A 480 496 16 20 1056014
 59 REEF-A 582 596 14 20 1056014
 63 REEF-A 632 644 12 20 4774042
 72 REEF-A 728 742 14 20 4774042
 82 REEF-A 831 847 16 20 9757024
 106 REEF-A 870 890 20 15 7310000
 92 REEF-A 933 946 13 20 9757024
 112 REEF-A 961 981 20 15 5329000
 140 REEF-A 1140 1150 10 15 7310000
 129 REEF-A 1231 1248 17 20 1056014
 149 REEF-A 1370 1384 14 20 4774043
 472 3.2777777778E-01

Day 2 Schedule.

5 POGO-A 25 40 15 15 9794000
 12 POGO-A 65 100 35 15 7837000
 18 POGO-A 135 150 15 15 8639000
 20 POGO-A 165 185 20 15 7310000
 25 POGO-A 200 215 15 15 7225000
 33 POGO-A 250 255 5 15 6392000
 36 POGO-A 270 280 10 15 9434000
 44 POGO-A 345 360 15 15 2941000
 47 POGO-A 375 390 15 15 6738000
 31 POGO-A 419 435 16 20 1056014
 36 POGO-A 460 475 15 20 6553055
 41 POGO-A 512 529 17 20 3187074
 45 POGO-A 554 570 16 20 0286045
 52 POGO-A 607 619 12 20 2532097
 57 POGO-A 656 672 16 20 0286045
 65 POGO-A 707 721 14 20 2532097
 69 POGO-A 758 769 11 20 6553055
 73 POGO-A 808 823 15 20 2532097
 78 POGO-A 858 868 10 20 6553055
 85 POGO-A 907 923 16 20 2532097
 115 POGO-A 960 985 25 15 8896000
 94 POGO-A 1015 1027 12 20 6790043
 98 POGO-A 1058 1075 17 20 0286045
 128 POGO-A 1090 1105 15 15 6374000
 102 POGO-A 1131 1143 12 20 3187074
 110 POGO-A 1205 1221 16 20 2532097
 117 POGO-A 1260 1276 16 20 0286045

120 POGO-A 1304 1320 16 20 2532097
 129 POGO-A 1362 1378 16 20 0286045
 133 POGO-A 1404 1420 16 20 2532097
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 8 POGO-B 45 90 45 15 1920000
 23 POGO-B 180 195 15 15 3028000
 27 POGO-B 210 240 30 15 8896000
 38 POGO-B 290 300 10 15 7506000
 43 POGO-B 345 390 45 15 2272000
 51 POGO-B 405 415 10 15 7310000
 35 POGO-B 453 467 14 20 0286045
 59 POGO-B 482 497 15 15 5681000
 66 POGO-B 545 570 25 15 6012000
 53 POGO-B 623 639 16 20 1056014
 74 POGO-B 654 669 15 15 9521000
 61 POGO-B 690 705 15 20 4774043
 84 POGO-B 720 730 10 15 7310000
 71 POGO-B 787 801 14 20 4774043
 74 POGO-B 827 843 16 20 1056014
 82 POGO-B 884 898 14 20 4774043
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Day 5 Schedule.

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Day 6 Schedule.

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Day 7 Schedule.

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13. ABSTRACT (Maximum 200 words) <p>The objective of this study was to develop a computer based satellite range scheduling (SRS) algorithm to create a 24 hour satellite support schedule. The algorithm's goal was to schedule as many satellite support requests as possible.</p> <p>An iterative heuristic approach was used to schedule satellite support requests in three successive sub problems. The first sub problem involves scheduling low altitude satellite support requests using a mixed integer programming approach. The next two sub problems each involve scheduling 12 hour blocks of medium and high altitude satellite support requests, again using a mixed integer programming approach.</p> <p>Fourteen 24 hour schedules were generated using actual data with encouraging results. At least 95 percent of the satellite support requests were scheduled for each day. These results are in-line with results obtained by range schedulers and previous studies. Because of the promising results, this algorithm may be used to automate a portion of the satellite range scheduling problem.</p>				
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